

## FINAL INDEX

### 1929 CAR MODELS

**NATIONAL SERVICE MANUAL**

**FINAL INDEX**

**1929 CAR MODELS**

Page	CAR	Model	Serial No.	Year	Make	BATTERY		Switch	LIGHTING								
						Model	Make		Model	Fuses	Breaker	Head	Aux.	Side	Dsh.-tail	Stop Dome	
																	Circuit
1428	AUBURN	6-80	2,981,851	1929	U.S.L.	XY-13X-6	Pos.	Sor.Man.	20	*	1129	*	63	63	87	63	
1430	AUBURN	8-90	2,971,829	1929	U.S.L.	XY-13X-6	Pos.	Sor.Man.	20	*	1158	*	63	63	87	63	
1432	AUBURN	125	2,950,502	1929	U.S.L.	XY-15X-6	Pos.	Sor.Man.	20	*	1129	*	63	63	87	63	
1434	BLACKHAWK	L-6	16,001 up	1929	P-O-L	615-J	Neg.	Delco-Remy	486-G	*	D.R.410 -C	1133	*	63	63	87	*
1436	BLACKHAWK	L-8	28,001 up	1929	P-O-L	615-J	Neg.	Delco-Remy	486-G	*	D.R.410 -C	1133	*	63	63	87	
1368	BUICK	116		1929	Exide	3-MVX-13-1	Neg.	Delco-Remy	484-A	*	D.R.410 -D	1110	*	63	63	87	81
1368	BUICK	121, 129		1929	Exide	3-MVX-15-1	Neg.	Delco-Remy	484-A	*	D.R.410 -D	1110	*	63	63	87	81
1370	CADILLAC	341-B	322501 up	1929	Exide	3-LXRV-15-2G	Pos.	Delco-Remy	486-D	*	D.R.5759	1110	*	63	63	87	63
1372	CHANDLER	65	C-50001 up	1929	P-O-L	A-613-JF	Pos.	Clum	10677	20	*	1110	*	63	63	63	81
1374	CHANDLER	75	1001 up	1929	P-O-L	A-615-JF	Pos.	Clum	10677	20	*	1110	*	63	63	63	81
1376	CHANDLER	Big 6	188,001 up	1929	P-O-L	A-615-JF	Pos.	Clum	10677	20	*	1110	*	63	63	63	81
1378	CHANDLER	85	E-108,001 up	1929	P-O-L	A-615-JF	Pos.	Clum	10677	20	*	1110	*	63	63	63	63
1438	CHEVROLET	Inter.	AC-1001 up	1929	Various		Neg.	Delco-Remy	478-C	20	*	1110	63	63	63	87	63
1380	CHRYSLER	65	LS400P up	1929	Willard	CWR-15	Pos.	Clum	10738	20	*	1110	*	64	64-1158	1158	87
1382	CHRYSLER	75	CY050P up	1929	Willard	CWR-17	Pos.	Clum	10738	*	D.R.410-B	1110	*	64	64-63	87	87
1384	CHRYSLER	80-L		1929	Willard	SJWR-6	Pos.	Clum	10738	*	D.R.410-B	1110	*	64	64-63	87	87
1440	CORD	L-29	2,925,001 up	1929	U.S.L.	XY-15X-6	Pos.	Sor.Man.	5650-A	*	D.R.	1110	*	63	63-87	87	63
1386	DE SOTO	K	KW000P up	1929	Willard	WR-13	Pos.	Clum	10738	20	*	1110	*	64	64-1158	1158	87
1442	DE SOTO	K-1		1929	Willard	WSB-13	Pos.	Sor.Man.	5500-A	20	*	1110	63	63	64	1158	87
1388	DODGE	Senior	S-50,001 up	1929	Willard	CWR-17	Pos.	B. & S.	40315	*	*	1110	*	63	63	87	81
1444	DODGE	Six	DA-1 up	1929	Willard	CWR-15	Pos.	Clum	8821	20	*	1110	*	63	63	1158	87
1446	DUPONT	G	801 up	1929	Exide	3-XC-15-1	Pos.	Sor.Man.		15	*	1110	81	63	63	1129	63
1448	DURANT	40	1000 up	1929	U.S.L.	3CVX-5X6	Neg.	Clum	10628	20	*	1129	*	63	63	1158	63
1450	DURANT	60	1000 up	1929	U.S.L.	3CVX-5X6	Neg.	Clum	10628	20	*	1129	*	63	63	1158	63
1452	DURANT	66	1000 up	1929	U.S.L.	3-CVX-6X6	Neg.	Clum	10725	20	*	1110	*	63	63	87	63
1390	ERSKINE	52		1929	Willard	CWR-13	Pos.	Delco-Remy	484-E	20	*	1110	*	63	63	87	81
1454	ESSEX	Chall.		1929	Exide	3-VXA-13-1	Neg.	Clum	10717	20	*	1110	*	63	63	87	63
1456	FORD	A		1929	Ford		Pos.	Ford	A-11654-B	*	*	1110	63	63	63	1129	*
1392	FRANKLIN	12		1929	Westing.	6-PRB-19	Neg.	Sor.Man.		20	*	1110	81	*	63-61	1129	63
1458	FRANKLIN	130	183,001 up	1929	U.S.L.	XY-17X-6	Pos.	Sor.Man.	5100	20	*	1110	*	63	63	87	63
1460	FRANKLIN	135,137	183,001 up	1929	U.S.L.	XY-19X-6	Pos.	Sor.Man.	5150	10	D.R.410-B	1129	*	63	63-61	1129	63
1394	GARDNER	120		1929	P-O-L	615-JFK	Pos.	Delco-Remy	420-Q	10	*	1110	63	81	63	87	64
1394	GARDNER	125		1929	P-O-L	615-JFK	Pos.	Delco-Remy	420-Q	10	*	1110	63	81	63	87	64
1396	GARDNER	130		1929	P-O-L	617-RHK	Pos.	Delco-Remy	420-Q	10	*	1110	63	81	63	87	64
1462	GRAHAM PAIGE	612	848,001 up	1929	Willard	WSB-13	Pos.	B.&S.	40585	20	*	1110	*	63	63	87	*
1464	GRAHAM PAIGE	615	713,001 up	1929	Willard	WSB-15	Pos.	B.&S.	40585	20	*	1110	*	63	63	87	81
1466	GRAHAM PAIGE	621	608,001 up	1929	Willard	WSB-17	Pos.	B.&S.	40585	20	*	1110	*	63	63	87	81
1468	GRAHAM PAIGE	827,837	713,001 up	1929	Willard	WSB-17	Pos.	B.&S.	40585	20	*	1110	*	63	63	1129	87
1470	HUDSON	S.S.	825,415 up	1929	Exide	3-XI-15-IG	Neg.	Clum	10717	20	*	1110	*	63	63	87	63
1472	HUPMOBILE	6-A		1929	Willard	RSB-15	Pos.	B.&S.		15	*	1110	*	63	63	87	63
1474	HUPMOBILE	8-M		1929	Willard	SJRR-4	Pos.	B.&S.		15	*	1110	*	63	63	87	63
1476	JORDAN	6-E	95,001 up	1929	Willard	WSB-15	Neg.	Sor.Man.		*	Kellogg	1110	*	63	63	87	*



# 1929 FINAL INDEX—EQUIPMENT USED

Make	IGNITION		Switch	STARTER		GENERATOR		Relay	Regulator	Year	Model	CAR	Page	
	Coil Model	Dist. Model		Make	Model	Make	Model							Make
Delco-Remy	528-C	641-F	Electrolock	5-A	Delco-Remy	716-C	Delco-Remy	955-H	265-B	1929	6-80	AUBURN	1428	
Delco-Remy	528-C	657-M	Electrolock	5-A	Delco-Remy	716-C	Delco-Remy	955-H	265-B	1929	8-90	AUBURN	1430	
Delco-Remy	528-C	657-L	Electrolock	5-A	Delco-Remy	718-A	Delco-Remy	955-J	265-B	1929	125	AUBURN	1432	
Delco-Remy	527-A	4043	Delco-Remy	426-J	Delco-Remy	726-C	Delco-Remy	949-H	265-B	1929	L-6	BLACKHAWK	1434	
Delco-Remy	528-C	658-U	Delco-Remy	426-J	Delco-Remy	724-J	Delco-Remy	944-N	265-B	1929	L-8	BLACKHAWK	1436	
Delco-Remy	528-H	640-J	Hershey		Delco-Remy	725-D	Delco-Remy	940-M	265-B	1929	116	BUICK	1368	
Delco-Remy	528-H	640-J	Hershey		Delco-Remy	725-D	Delco-Remy	940-M	265-B	1929	121,129	BUICK	1368	
Delco-Remy	2195	4041	Delco-Remy	426-A,E	Delco-Remy	382	Delco-Remy	384	266-N	1929	341-B	CADILLAC	1370	
Auto-Lite	IG-4064	IGB-4018	Electrolock	5-B	Auto-Lite	MZ-4015	Auto-Lite	GAL-4115	CB-4014	1929	65	CHANDLER	1372	
Auto-Lite	IG-4064	IGH-4001-A	Electrolock	5-B	Auto-Lite	MAC-4103	Auto-Lite	GAG-4113	CB-4014	1929	75	CHANDLER	1374	
Delco-Remy	525-C	641-C	Electrolock	5-B	Delco-Remy	720-W	Delco-Remy	944-C	265-B	1929	Big 6	CHANDLER	1376	
Delco-Remy	525-C	658-G	Electrolock	5-B	Delco-Remy	727-A	Delco-Remy	944-D	265-B	1929	85	CHANDLER	1378	
Delco-Remy	528-B	633-G	Electrolock	427-B	Delco-Remy	714-L	Delco-Remy	943-J	265-B	1929	6	CHEVROLET	1438	
Delco-Remy	525-E	631-B	Shaler	Lock	Delco-Remy	714-D	Delco-Remy	943-H	265-B	1929	65	CHRYSLER	1380	
Delco-Remy	525-E	659-B	Electrolock	5-B	Delco-Remy	728-B	Delco-Remy	955-F	265-B	1929	75	CHRYSLER	1382	
Delco-Remy	525-E	659-B	Electrolock	5-B	Delco-Remy	728-A	Delco-Remy	949-Q	265-B	1929	80-L	CHRYSLER	1384	
Delco-Remy	526-V	658-W	Coil Lock		Delco-Remy	724-N	Delco-Remy	941-T	265-F	1929	L-29	CORD	1440	
Delco-Remy	525-E	631-C	Shaler	Lock	Delco-Remy	714-J	Delco-Remy	943-H	265-B	1929	K	DE SOTO	1386	
NorthEast	21998	TBU-10849	Coil		Lock	NorthEast	SBH6534	NorthEast	LAB-6530	20220	K-1	DE SOTO	1442	
NorthEast	19232	TBU,10846-A	Coil		Lock	NorthEast	6400	NorthEast	6390-A	20220	Senior	DODGE	1388	
NorthEast	21904	10845	Coil		Lock	NorthEast	6494	NorthEast	6530	20220	6	DODGE	1444	
Delco-Remy	525-C	658-A	Clum		Delco-Remy	720-Q	Delco-Remy	945-U	265-B	1929	G	DU PONT	1446	
Auto-Lite	IG-4066	IGB-4019-A	Clum		10628	Auto-Lite	MZ-4012	Auto-Lite	GAL-4105	CB-4014	1929	40	DURANT	1448
Auto-Lite	IG-4066	IGB-4006-B	Clum		10628	Auto-Lite	MZ-4012	Auto-Lite	GAL-4104	CB-4014	1929	60	DURANT	1450
Auto-Lite	IG-4066	IGB-4008-B	Shaler Lock			Auto-Lite	MZ-4001	Auto-Lite	GAL-4104	CB-4014	1929	66	DURANT	1452
Delco-Remy	525-A	639-R	Hershey		Delco-Remy	712-H	Delco-Remy	940-J	265-B	1929	52	ERSKINE	1390	
Auto-Lite	IG-4065	IGB-4022	Electrolock	9-B	Auto-Lite	MZ-4014	Auto-Lite	GAM-4101	CB-4016	1929	Chall	ESSEX	1454	
Ford			Electrolock	6-A	Ford		Ford			1929	A	FORD	1456	
NorthEast	TU	TBU	Electrolock	5-A	Owen-Dyneto	DH-696	Owen-Dyneto	CD-814	Owen-Dyn	1929	12	FRANKLIN	1392	
Delco-Remy	528-W	640-T	Coil		Lock	Delco-Remy	723-C	Delco-Remy	945-Y	265-B	1929	130	FRANKLIN	1458
Delco-Remy	528-X	640-T	Coil		Lock	Delco-Remy	723-C	Delco-Remy	945-Y	265-B	1929	135,37	FRANKLIN	1460
Delco-Remy	528-Y	658-B	Coil		Lock	Delco-Remy	716-A	Delco-Remy	949-C	265-B	1929	120	GARDNER	1394
Delco-Remy	528-Y	658-B	Coil		Lock	Delco-Remy	716-A	Delco-Remy	949-C	265-B	1929	125	GARDNER	1394
Delco-Remy	528-Y	658-R	Coil		Lock	Delco-Remy	720-Q	Delco-Remy	941-D	265-B	1929	130	GARDNER	1396
Delco-Remy	528-C	639-V	Hershey Lock		Delco-Remy	713-K	Delco-Remy	955-Q	265-B	1929	612	GRAHAM PAIGE	1462	
Delco-Remy	528-C	639-W	Hershey Lock		Delco-Remy	718-E	Delco-Remy	957-B	265-B	1929	615	GRAHAM PAIGE	1464	
Delco-Remy	528-C	640-U	Hershey Lock		Delco-Remy	725-G	Delco-Remy	957-C	265-B	1929	621	GRAHAM PAIGE	1466	
Delco-Remy	528-C	668-D	Hershey Lock		Delco-Remy	725-G	Delco-Remy	957-G	265-B	1929	827,37	GRAHAM PAIGE	1468	
Auto-Lite	IG-4065	IGA-4058	Electrolock	9-B	Auto-Lite	MUA-4001	Auto-Lite	GAB-4008	CB-4014	1929	S.S.	HUDSON	1470	
Auto-Lite	IG-4065	IGC-4003	Electrolock	5-A	Auto-Lite	MN-4109	Auto-Lite	GAJ-4106	CB-4012	1929	6-A	HUPMOBILE	1472	
Auto-Lite	IG-4065	IGH-4002	Electrolock	5-A	Auto-Lite	ML-4139	Auto-Lite	GAG-4106	CB-4012	1929	8-M	HUPMOBILE	1474	
Auto-Lite	IG-4066	IGB-4006	Hershey Lock		Auto-Lite	MAB-4104	Auto-Lite	GAG-4114	CB-4012	1929	6-E	JORDAN	1476	

Page	CAR	Model	Serial No.	Year	Make	BATTERY		Gr. Ter.	Switch		LIGHTING						
						Type			Make	Model	Fuses	Circuit Breaker	Head	Aux.	Side	Dsh.-tail	Stop Dome
1478	JORDAN	8-G	130,001 up	1929	Willard	WSB-15	Neg.		Sor.Man.		*	Kellogg	1110	*	63	63	87
1480	KISSEL	6-73	73-1000 up	1929	Willard	CWR-13	Pos.		B.&S.		10	*	1133	*	63	64-63	63
1482	KISSEL	8-95	95-1000 up	1929	Willard	SJWR-4	Pos.		B.&S.		10	*	1133	*	63	64-63	63
1484	KISSEL	126	126-1001 up	1929	Willard	SJWR-4	Pos.		B.&S.		10	*	1133	*	81	82-81	81
1398	LA SALLE	328	400,001 up	1929	Exide	3-MXV-15-1	Pos.		Delco-Remy	486-D	*	D.R.5759	1110	*	63	63	87
1400	LINCOLN			1929	Exide	3-LXRV-15-2	Neg.		Lincoln		*	D.R.5770	1110	*	81	63	1129
1402	MARMON	68		1929	P-O-L	615-JFK	Pos.		B. & S.	Special	*	D.R.410-C	1110	*	63	63	1129
1404	MARMON	78		1929	P-O-L	615-JFK	Pos.		B. & S.	Special	*	D.R.410-C	1110	*	63	63	1129
1486	MARQUETTE	30		1930	Exide	3VXA-13-1	Neg.		Delco-Remy	486-B	*	D.R.410-A	1110	*	63	63	87
1406	NASH	Standard	400 Series	1929	U.S.L.	3-HVX-5X6	Neg.		B. & S.	40153	20	*	1110	*	63	63	87
1408	NASH	Advanced	400 Series	1929	U.S.L.	3-HVX-5X6	Pos.		B. & S.	40153	20	*	1110	*	63	63	87
1410	NASH	Special	400 Series	1929	U.S.L.	3-HVX-5X6	Pos.		B. & S.	40153	20	*	1110	*	63	63	87
1412	OAKLAND	212	227000 up	1929	Willard	WSB-15	Neg.		Clum		20	*	1110	*	63	63	87
1488	OLDSMOBILE	F-29		1929	Willard	UCB-13	Neg.		Delco-Remy	486-B	*	D.R.410-C	1110	*	63	63	87
1490	PACKARD	626,33		1929	P-O-L	A-615-SF	Pos.				20	*	1110	*	63	63	1129
1490	PACKARD	640,45		1929	P-O-L	A-617-SF	Pos.				20	*	1110	*	63	63	1129
1492	PEERLESS	6-81		1929	U.S.L.	XY-15X-6	Pos.		Sor.Man.		20	*	1110	*	63	63	87
1494	PEERLESS	125		1929	Exide	3-XC-19-1	Pos.		Sor.Man.		20	*	1110	*	63	63	87
1496	PIERCE ARROW	125,126		1929	U.S.L.	3-HVX-6X-6A	Pos.		Delco-Remy	486-D	*	D.R.410-C	1129	81	*	63-81	1129
1414	PLYMOUTH	Q	HL950P up	1929	Willard	WR-13	Pos.		Clum	10738	20	*	1110	*	*	64-1158	1158
1498	PONTIAC	6-29	"Big Six"	1929	Willard	RSB-13	Neg.		Clum		20	*	1110	*	63	63	87
1416	REO	C		1929	Willard	SJRR-4	Neg.		Delco-Remy	482-F	20	*	1110	*	63	63	87
1500	REO	"Mate"		1929	Willard	RSB-13	Neg.		Delco-Remy	482-F	20	*	1110	*	63	63	87
1502	ROOSEVELT	"R"	S-70-500 up	1929	National		Pos.		Aid		*	D.R.410-C	1110	*	63	63	87
1418	STEARNS KNIGHT	M & N 6-80		1929	U.S.L.	3-HVX-8X4	Neg.		B. & S.	40639	20	*	1110	*	63	63	1129
1420	STEARNS KNIGHT	H & J 8-90		1929	U.S.L.	3-CVX-10X	Neg.		B. & S.	40701	20	*	1110	*	63	63	1129
1422	STUDEBAKER	Dictator		1929	Willard	SJWR-3	Pos.		Delco-Remy	484-D	*	D.R.410-C	1110	*	63	63	81
1424	STUDEBAKER	Comm		1929	Willard	SJWR-4	Pos.		Delco-Remy	484-D	*	D.R.410-C	1110	*	63	63	81
1426	STUDEBAKER	Pres		1929	Willard	SJWR-4	Pos.		Delco-Remy	484-D	*	D.R.410-C	1110	*	63	63	81
1504	STUDEBAKER	Dict. 8		1929	Willard	SJWR-3	Pos.		Delco-Remy	486-E	*	D.R.410-C	1110	*	63	63	87
1506	STUDEBAKER	Comm. 6	4,070,501 up	1929	Willard	SJWR-3	Pos.		Delco-Remy	486-E	*	D.R.410-C	1110	*	63	63	87
1508	STUDEBAKER	Comm. 8	8,000,000 up	1929	Willard	SJWR-3	Pos.		Delco-Remy	486-E	*	D.R.410-C	1110	*	63	63	87
1510	STUDEBAKER	Pres. 8	6,013,001 up	1929	Willard	SJWR-4	Pos.		Delco-Remy	486-E	*	D.R.410-C	1110	*	63	63	87
1512	STUTZ	"M"	30,001 up	1929	P-O-L	A-617-SH	Neg.		Delco-Remy	486-G	*	D.R.410-C	1133	*	63	63	87
1514	VIKING	V-8		1930	Willard	WSB-15	Neg.		Delco-Remy	486-B	*	D.R.410-C	1110	63	*	63	87
1516	WHIPPET	96-A		1929	U.S.L.	3-CVX-5X6	Neg.		Aid	311	20	*	1110	*	63	63	1158
1518	WHIPPET	98-A		1929	U.S.L.	3-CVX-6X-6A	Neg.		Aid	311	20	*	1110	*	63	63	1158
1520	WILLYS KNIGHT	70-B		1929	U.S.L.	3-HVX-6X-6	Neg.		Aid	311	20	*	1110	*	63	63	1158
1522	WINDSOR	6-69		1929	U.S.L.	XY-13X	Neg.		Delco-Remy	1303	*	D.R.	1110	*	63	63	*
1524	WINDSOR	6-77		1929	U.S.L.	XY-15X-6	Neg.		Delco-Remy	1309	*	*	1110	*	81	63	87
1526	WINDSOR	8-82,92		1929	U.S.L.	3-HVX-7X	Neg.		Delco-Remy	1309	*	*	1110	*	81	63	87

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Make	IGNITION		Switch	STARTER		GENERATOR		Relay	Year	Model	CAR	Page	
	Coil Model	Dist. Model		Model	Make	Model	Make						Regulator
Auto-Lite	IG-4078	IGJ-4001-A	Hershey Lock	Auto-Lite	MUA-4007	Auto-Lite	GAG-4109	CB-4012	1929	8-G	JORDAN	1478	
Delco-Remy	528-C	640-L	Clum	4790	Delco-Remy	716-A	Delco-Remy	955-H	265-B	1929	6-73	KISSEL	1480
Delco-Remy	528-C	658-L	Clum	4790	Delco-Remy	716-A	Delco-Remy	955-H	265-B	1929	8-95	KISSEL	1482
Delco-Remy	528-C	668-B	Clum	4790	Delco-Remy	720-Q	Delco-Remy	941-W	265-B	1929	126	KISSEL	1484
Delco-Remy	2195	4041	Delco-Remy	426-B,F	Delco-Remy	725-C	Delco-Remy	384	266-N	1929	328	LA SALLE	1398
Delco-Remy	2192	5226	Lincoln		Delco-Remy	193	Delco-Remy	193	None	1929		LINCOLN	1400
Delco-Remy	525-C	658-C	Delco-Remy	425-F	Delco-Remy	714-C	Delco-Remy	949-X	265-B	1929	68	MARMON	1402
Delco-Remy	525-C	658-M	Delco-Remy	425-F	Delco-Remy	726-A	Delco-Remy	949-F	265-B	1929	78	MARMON	1404
Delco-Remy	528-Q	639-Y	Coil	Lock	Delco-Remy	714-N	Delco-Remy	943-K	265-G	1930	30	MARQUETTE	1486
Auto-Lite	IG-4065	IGB-4015		Auto-Lite	MAC-4213	Auto-Lite	GAL-4111	CB-4014	1929	Standard	NASH	1406	
Auto-Lite	IG-4065	IGE-4001	Delco-Remy	Auto-Lite	MAD-4102	Auto-Lite	GAO-4101	CB-4014	1929	Advanced	NASH	1408	
Auto-Lite	IG-4065	IGE-4002	Delco-Remy	Auto-Lite	MAD-4102	Auto-Lite	GAL-4108	CB-4011	1929	Special	NASH	1410	
Delco-Remy	528-C	640-K	Delco-Remy	425-K	Delco-Remy	714-F	Delco-Remy	949-N	265-B	1929	212	OAKLAND	1412
Delco-Remy	528-Z	639-G	Coil	Lock	Delco-Remy	714-H	Delco-Remy	949-W	265-B	1929	F-29	OLDSMOBILE	1488
NorthEast	21000	10858	Coil	Lock	Owen-Dyneto	DM-696	Owen-Dyneto	CD-840	20100	1929	626,33	PACKARD	1490
NorthEast	21000	10858	Coil	Lock	Owen-Dyneto	DM-696	Owen-Dyneto	CD-840	20100	1929	640,45	PACKARD	1490
Auto-Lite	IG-4066	IGB-4019-A	Electrolock	5-B	Auto-Lite	MAD-4104	Auto-Lite	GAG-4114	CB-4012	1929	6-81	PEERLESS	1492
Delco-Remy	553-C	668-D	Coil	Lock	Delco-Remy	725-G	Delco-Remy	945-J	265-B	1929	125	PEERLESS	1494
Delco-Remy	528-E	668-E	Hershey Lock		Delco-Remy	728-C	Delco-Remy	955-C	265-B	1929	125,6	PIERCE ARROW	1496
Delco-Remy	525-E	638-B	Shaler	Lock	Delco-Remy	714-J	Delco-Remy	947-B	265-B	1929	Q	PLYMOUTH	1414
Delco-Remy	528-C	639-U	Delco-Remy	425-L	Delco-Remy	714-F	Delco-Remy	943-J	265-B	1929	Big 6	PONTIAC	1498
Delco-Remy	525-E	640-G	Delco-Remy	425-C	Delco-Remy	724-M	Delco-Remy	955-G	265-B	1929	C	REO	1416
Delco-Remy	528-E	641-D	Electrolock	5-B	Delco-Remy	726-E	Delco-Remy	955-L	265-B	1929	Mate	REO	1500
Delco-Remy	528-E	658-A	Coil	Lock	Delco-Remy	714-C	Delco-Remy	949-X	265-B	1929	R	ROOSEVELT	1502
Auto-Lite	IG-4065	IGA-4036	Electrolock	5-A	Auto-Lite	MAB-4001	Auto-Lite	GRE-4207	CB-4009	1929	M&N6-80	STEARNS KNIGHT	1418
DeJon	CA-4023	IAA-4002		DeJon	SD-4102	DeJon	DJ-4102	RA-4001A	1929	H&J8-90	STEARNS KNIGHT	1420	
Delco-Remy	525-E	636-Y	Hershey		Delco-Remy	720-N	Delco-Remy	949-J	265-B	1929	Dictator	STUDEBAKER	1422
Delco-Remy	525-E	636-X	Hershey		Delco-Remy	723-B	Delco-Remy	941-L	265-B	1929	Comm	STUDEBAKER	1424
Delco-Remy	525-E	668-A	Hershey		Delco-Remy	724-H	Delco-Remy	955-C	265-B	1929	Pres	STUDEBAKER	1426
Delco-Remy	528-E	658-Z	Hershey Lock		Delco-Remy	726-G	Delco-Remy	955-S	265-B	1929	Dict. 8	STUDEBAKER	1504
Delco-Remy	528-E	636-Y	Hershey Lock		Delco-Remy	726-F	Delco-Remy	949-J	265-B	1929	Comm. 6	STUDEBAKER	1506
Delco-Remy	528-E	658-V	Hershey Lock		Delco-Remy	726-G	Delco-Remy	955-C	265-B	1929	Comm. 8	STUDEBAKER	1508
Delco-Remy	528-E	668-C	Hershey Lock		Delco-Remy	728-C	Delco-Remy	955-C	265-B	1929	Pres. 8	STUDEBAKER	1510
Delco-Remy	527-A	4028	Delco-Remy	426-C	Delco-Remy	726-C	Delco-Remy	391	265-B	1929	M	STUTZ	1512
Delco-Remy	528Z,P	658-T	Coil	Lock	Delco-Remy	725-H	Delco-Remy	955-R	265-B	1930	V-8	VIKING	1514
Auto-Lite	IG-4065	IGB-4020-A	Electrolock	9-A	Auto-Lite	MZ-4001	Auto-Lite	GAL-4116	CB-4014	1929	96-A	WHIPPET	1516
Auto-Lite	IG-4065	IGB-4021	Electrolock	9-A	Auto-Lite	MZ-4011	Auto-Lite	GAL-4106	CB-4014	1929	98-A	WHIPPET	1518
Auto-Lite	IG-4065	IGC-4004	Electrolock	9-A	Auto-Lite	MAB-4014	Auto-Lite	GAL-4103	CB-4014	1929	70-B	WILLYS KNIGHT	1520
Auto-Lite	IG-4066	IGB-4006	Delco-Remy	1302	Auto-Lite	MAD-4104	Auto-Lite	GAL-4104	CB-4012	1929	6-69	WINDSOR	1522
Delco-Remy	526-W	640-F	Coil	Lock	Delco-Remy	714-G	Delco-Remy	949-V	265-B	1929	6-77	WINDSOR	1524
Delco-Remy	528-C	658-H	Coil	Lock	Delco-Remy	724-J	Delco-Remy	940-N	265-B	1929	8-82,92	WINDSOR	1526







# BUICK

**BATTERY:**—Exide (Model 116), Type 3-MXV-13-1, 6 volt, 13 plates. The negative (—) terminal is grounded. Starting capacity (20 minute rate) is 114 amperes for 20 minutes. Lighting capacity (5 ampere rate) is 5 amperes for 20 hours.

(Models 121 and 129), Type 3-MVX-15-1, 6 volt, 15 plates. The negative (—) terminal is grounded. Starting capacity (20 minute rate) is 133 amperes for 20 minutes. Lighting capacity (5 ampere rate) is 5 amperes for 24 hours.

**IGNITION:—Coil Model 528-H. Distributor Model 640-J. Breaker contacts separate .018-.024 inch with breaker arm on lobe of cam. Resurface contacts with a fine flat contact file or on a medium hard oilstone. Breaker arm spring tension is 17-21 ounces. Distributor is semi-automatic. Manual advance is 24 degrees (engine). Automatic advance begins at 500 R.P.M. Maximum automatic advance is 26 degrees reached at 2400 R.P.M. (engine).**

**Mounting:**—Coil is mounted on the engine case in front of generator. Distributor is mounted in a well on the commutator end of the generator. To remove distributor, disconnect primary lead and manual advance rod. Remove head with high tension cables intact. Remove advance arm stop screw and lift distributor from place.

**Oiling:**—Distributor shaft is oiled from the gear case. Oil gears with Zerk gun through connection on side of gear compartment every 500 miles. Remove the distributor head and rotor and put 4 or 5 drops of light oil in the wick oiler in the center of the shaft and put a small bit of vaseline on the face of the breaker cam every 2000 miles.

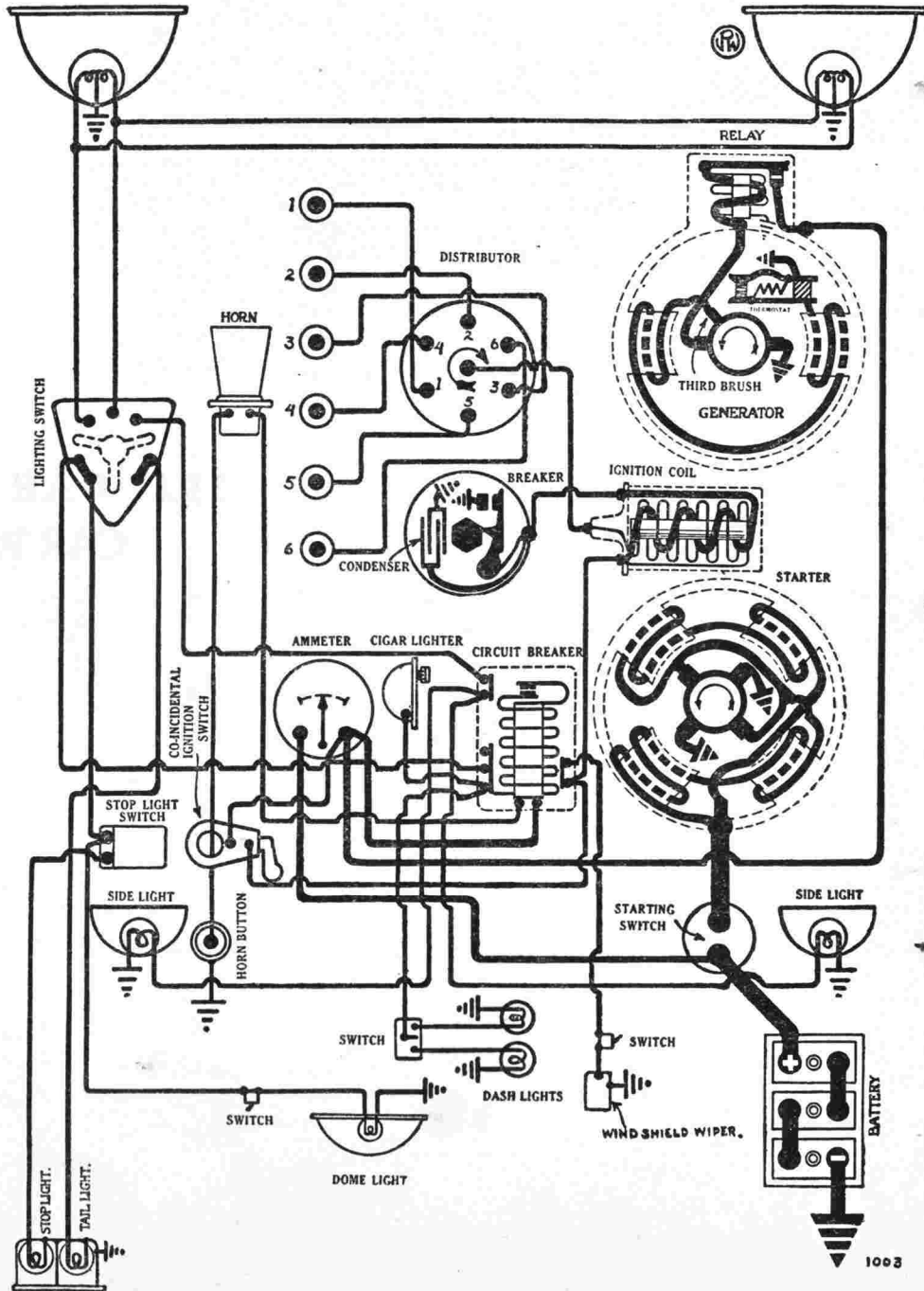
**Timing:**—Breaker contacts begin to separate when the piston entering power stroke reaches a position 15 degrees (Model 116) and 17 degrees (Models 121 and 129) before top dead center (measured on the flywheel) with the manual advance lever fully advanced. To set timing, crank engine over until piston No. 1 enters compression stroke. This is the up stroke with both valves closed. Fully advance spark lever. Remove cover over peephole in crankcase over flywheel, on right side of engine, and continue to crank engine until the flywheel mark is directly opposite the line on the edge of the hole. The rotor must be opposite the segment connected to the spark plug in cylinder No. 1 (see diagram). If it is not, remove manual advance stop screw and lift distributor to disengage gears. Then rotate rotor and shaft until rotor is directly opposite proper segment, remesh gears and replace stop screw. Then loosen the advance arm clamp screw and rotate distributor housing until contacts begin to separate. Connect the segment opposite the rotor to spark plug in cylinder No. 1 and connect remaining plugs in order 4-2-6-3-5 clockwise around the distributor head.

**Firing Order:**—The firing order is 1-4-2-6-3-5.

**Spark Plugs:**—Spark plugs are A.C. Metric. Gaps are .025 inch.

**VALVE TIMING:—INLET VALVES:—Model 116.)** Head diameter is 1 9/16 inches; stem diameter is 3/8 inch. Tappet clearance is .008 inch (hot). Valve lift is 21/64 inch. Spring pressure is 44-56 pounds closed and 125-141 pounds open. Inlet valves open at 2 degrees after top dead center and close at 42 degrees after lower dead center.

**EXHAUST VALVES:**—Head diameter is 1 9/16 inches; stem diameter is 3/8 inch. Tappet clearance is .008 inch (hot). Valve lift is 21/64 inch. Spring pressure is 44-56 pounds closed and 125-141 pounds open. Exhaust valves open at 50 degrees before lower dead center and close at 20 degrees after top dead center.



# BUICK

## MODELS 116, 121 AND 129 (1929)

### DELCO-REMY GENERATING, STARTING SYSTEM DELCO-REMY IGNITION

**INLET VALVES:**—(Models 121 and 129.) Head diameter is  $1\frac{7}{8}$  inches; stem diameter is  $\frac{3}{8}$  inch. Tappet clearance is .008 inch (hot). Valve lift is  $21/64$  inch. Spring pressure is 44-56 pounds closed and 125-141 pounds open. Inlet valves open at 20 degrees and 4 minutes after top dead center and close  $52\frac{1}{2}$  degrees after lower dead center.

**EXHAUST VALVES:**—Head diameter is  $1\frac{9}{16}$  inches; stem diameter is  $\frac{3}{8}$  inch. Tappet clearance is .008 inch (hot). Valve lift is  $21/64$  inch. Spring pressure is 44-56 pounds closed and 125-141 pounds open. Exhaust valves open at 50 degrees before lower dead center and close at 20 degrees after degrees and 4 minutes after top dead center. Valve stem guides are removable.

**STARTER:**—Model 725-D. Starter is connected to the engine through a mechanical gear shift. The direction of rotation is counter-clockwise, looking at the commutator end. Starter brush spring tension is  $1\frac{1}{2}$ - $1\frac{3}{4}$  pounds.

#### Starter Data

Torque	R.P.M.	Volts	Amperes
0 lb. ft.	6000	5	60
16 "	Lock	3	600

**Mounting:**—Starter is flange mounted at the right of the engine on the for- and cable. Remove flange mounting screws and pull starter forward. Lift unit from place.

**Oiling:**—Put 8 or 10 drops of light engine oil in the oiler on the commutator end of the starter every 1000 miles. The drive end bearings are oilless. They require no attention.

**GENERATOR:**—Model 940-M. The direction of rotation is counter-clockwise, looking at the commutator end. Generator current regulation is by third brush shunt field and thermostat. Thermostat contacts open at 165 degrees F. cutting the resistance across the thermostat contacts in series with the shunt field and reducing the output approximately 40%. To adjust generator output, remove commutator cover band and loosen the small round-

headed screw on the end plate. Then shift the third brush in a counter-clockwise direction to increase the charging rate and in the opposite direction to decrease the charging rate. Tighten the screw after making the adjustment.

#### Generator Data

Cold Test		Hot Test	
Amperes	Volts	Amperes	Volts
18-20	8.35-8.5	9-12	7.35-7.65
Generator motoring, draws 5.5-6 amperes at 6 volts. Shunt field current is 4-6.1 amperes at 6 volts. Brush spring tension is 22-26 ounces.		R.P.M. 1800-2000	

**Mounting:**—Generator is mounted at the right of the engine on the timing gear case. To remove generator, disconnect lead and water pump. Remove the distributor. Remove mounting screws and pull generator to the rear and out.

**Oiling:**—Put 8 or 10 drops of light oil in the oiler on the commutator end of the generator every 500 miles. The drive end bearing is oiled by splash from the timing gear case.

**RELAY:**—Model 265-B. Relay is mounted on the generator. Relay contacts close at approximately 8 miles per hour when the generator voltage reaches 6.75-7.5 volts and open with a discharge current of 0-2.5 amperes. Charging current at closing of contacts must not exceed 3 amperes. Relay contacts separate .015-.025 inch. Air gap is .014-.021 inch with contacts closed.

**LIGHTING:**—Switch Model 484-A. Lighting switch is mounted at the base of the steering column. Head lights are 6-8 volt, 21-21 cp. (double filament-double contact) Mazda 1110. Side, dash, tail and corner lights are 6-8 volt, 3 cp. S.C. Mazda 63. Dome light is 6-8 volt, 6 cp. S.C. Mazda 81. Stop and backing light is 15 cp. S.C. Mazda 87.

**CIRCUIT BREAKER:**—Model 410-D. A vibrating circuit breaker is mounted on the back of the dash. It begins to operate with a current of 25-30 amperes and continues to vibrate limiting the current to 10-15 amperes until the short circuit is repaired.

# CADILLAC

SERIES 341-B, BEGINNING ENGINE NO. 322501

PRODUCTION STARTED AUGUST, 1928

DELCO-REMY GENERATING, STARTING SYSTEM

DELCO-REMY IGNITION

**BATTERY:**—Exide. Type 3-LXRV-15-2G. 6 volt. Rated capacity is 130 ampere hours. Starting capacity is 137 amperes for 20 minutes (20 minute rate). Lighting capacity (5 ampere rate) is 5 amperes for 26 hours. The positive (+) terminal is grounded. Battery is mounted on right frame member under dust shield. The battery is not interchangeable with the Series 314 battery because the filler plugs are located on the opposite side of the cap.

**IGNITION:**—Coil Model 2195. Distributor Model 4041. Breaker contacts separate .022-.027 inch. They are made of tungsten. Resurface contacts whenever necessary with fine flat contact file or on medium hard oilstone. Distributor is semi-automatic. Maximum manual advance is 38 degrees (engine). Automatic advance begins at approximately 1100 R.P.M. Maximum automatic advance is 21 degrees (engine). Breaker arm spring tension is 16-20 ounces. There are two sets of breaker contacts set at an angle of 135 degrees and operating on a four lobed cam. Contacts open alternately at intervals of 45 degrees, corresponding to 90 degrees of crankshaft rotation. This is the correct firing interval for the Cadillac engine and must be accurately set. (See Timing).

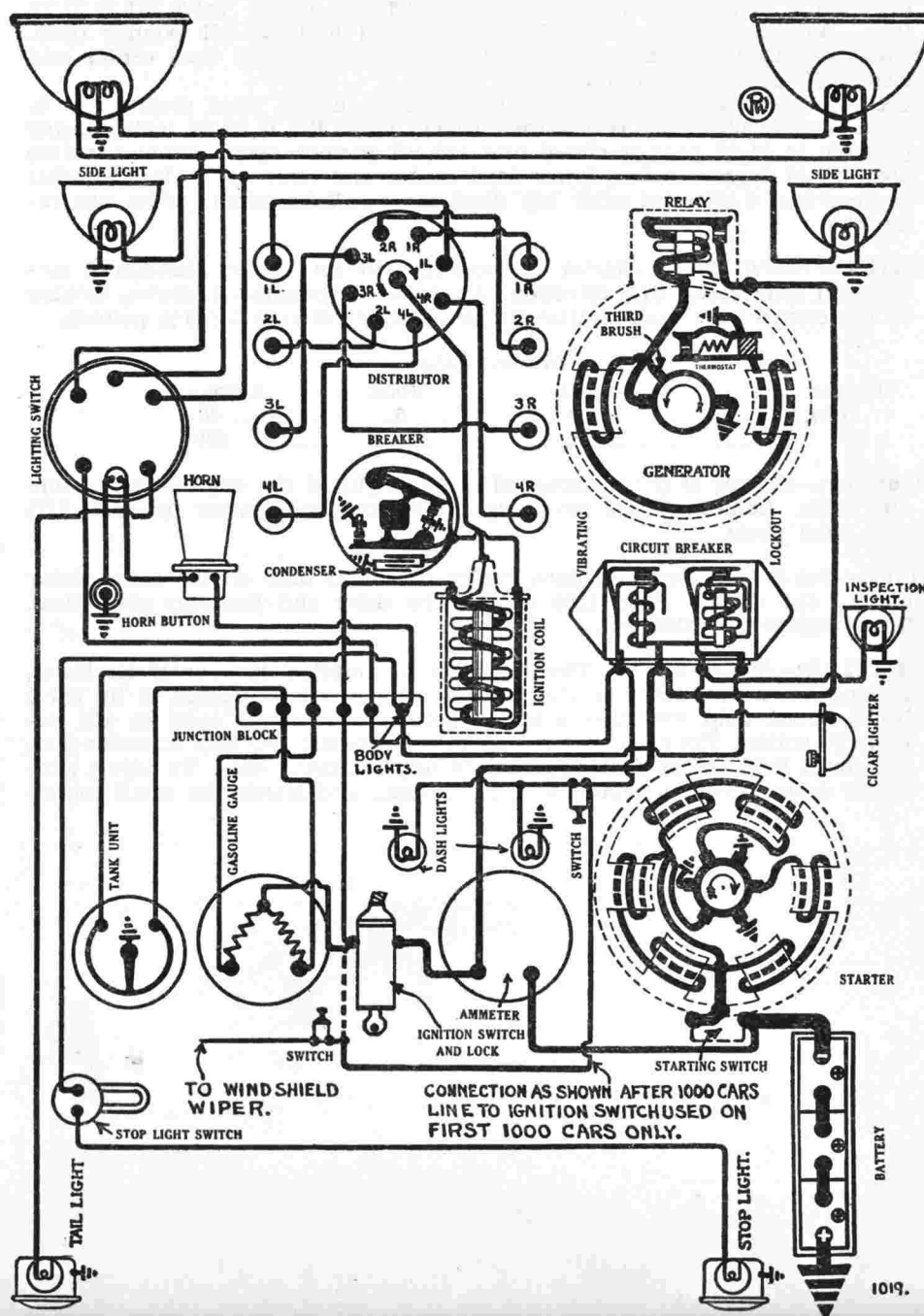
**Mounting:**—Ignition coil is mounted on side of distributor support. Distributor is mounted at front of engine between cylinder banks. A Blossom Co-incidental ignition switch is used. To remove the distributor, disconnect the primary feed wire, manual advance rod and remove the distributor cap with the high tension cables attached. Then remove the hold-down screw and lift the distributor from place. (NOTE:—The lower end of the distributor shaft has an offset tongue which fits a groove in the top of the driving shaft. Do not try to force the distributor into place as the tongue may be turned 180 degrees from its correct position.)

**Oiling:**—Put 8 or 10 drops of light engine oil in the oiler on the side of the distributor housing every month or 1000 miles.

**Timing:**—Synchronization of Contacts:—Use Delco-Remy Tool, Part No. 822572 and follow directions on Page S-30. This is important and contacts must be synchronized when distributor timing is checked.

**Timing Distributor to Engine:**—One set of breaker contacts begin to separate when the piston entering power stroke reaches a position  $\frac{7}{8}$  inch on the flywheel before top dead center with the spark lever fully advanced. With piston No. 1R in firing position the flywheel mark "IG/A-1-5" will be opposite the indicator on the flywheel case. This mark is  $\frac{7}{8}$  inch before top dead center. To set timing, crank engine over until piston No. 1 enters compression stroke (the up stroke with both valves closed). Fully advance spark lever. Then continue to crank engine until flywheel mark "IG/A-1-5" is opposite the indicator on the case. If contacts are not beginning to separate, loosen the taper screw in the center of the cam and rotate cam until one set of contacts open. The other set will be open but just closing. Tighten the screw. The second set of contacts open 45 degrees (distributor) after this point with the flywheel mark "IG/A-2-6" opposite the indicator. Beginning with Series 341-B, engine unit 322501, high compression heads are standard equipment. The flywheel setting remains the same as for former low compression heads ( $\frac{7}{8}$  of an inch before top dead center). The reason for this same setting is that the new distributor 4041 has different advance characteristics which take care of the high compression heads.

**VALVE TIMING:**—INLET VALVES:—Head diameter,  $1\frac{1}{2}$  inch; stem diameter,  $\frac{3}{8}$  inch; stem length,  $6\frac{17}{64}$  inches. Valve lift,  $\frac{23}{64}$  inch. Spring pressure





# CADILLAC

SERIES 341-B, BEGINNING ENGINE NO. 322501  
 PRODUCTION STARTED AUGUST, 1928  
 DELCO-REMY GENERATING, STARTING SYSTEM  
 DELCO-REMY IGNITION

156-164 pounds compressed to 2 5/32 inch. Tappet clearance is .004 inch (cold). Inlet valves open 9 1/2 degrees before top dead center and close 58 1/2 degrees after lower dead center. Width of valve seat on cylinder block 1/16 inch.

EXHAUST VALVES:—Head diameter, 1 1/2 inch; stem diameter, 3/8 inch; stem length, 6 1/4 inches. Valve lift, 23/64 inch. Spring pressure 156-164 pounds compressed to 2 5/32 inch. Tappet clearance is .006 inch (cold). Exhaust valves open 46 degrees before lower dead center and close 5 degrees after top dead center. Width of valve seat on cylinder block 5/64 inch. All valve stem guides are removable. No oversize valve stems are supplied.

**Firing Order:**—The firing order is IL-4R-4L-2L-3R-3L-2R-1R. The right hand cylinder bank is right viewed from the driver's seat. Number one cylinder is nearest the radiator.

**Spark Plugs:**—Spark plugs are 7/8-18 S.A.E. Standard. All engines are equipped with A.C. type Y special high compression or semi-aircraft type plugs. Gaps are set at .025-.028 inch.

**STARTER:**—Model 382. Starter is connected to the engine through a mechanical pinion shift interconnected with the starting pedal. The direction of rotation is clockwise, looking at the commutator end. Starter brush spring tension is 24-28 ounces.

Starter Data			
Torque	R.P.M.	Volts	Amperes
4.5 lb. ft.....	750.....	5.....	200
19.0 ".....	Lock.....	3.....	600

**Mounting:**—Starter is mounted at right of engine on rear of flywheel case. To remove starter, disconnect cable and starter pedal linkage and remove three flange mounting capscrews. Then pull starter to rear and lift from place.

**Oiling:**—Starter bearings are oilless. They require no attention.

**GENERATOR:**—Model 384. The direction of rotation is counter-clockwise, looking at the commutator end. Generator current regulation is by third brush shunt field combined with a thermostat. Thermostat contacts open at 165 degrees F. inserting a resistance in the field circuit and reducing the out-

put approximately 2.5 amperes. Generator output is adjusted by shifting third brush. Remove commutator cover band and shift third brush mounting plate in a counter-clockwise direction to increase the charging rate and in the opposite direction to decrease the charging rate. The third brush is held in any position by friction washers. The maximum charging rate of 18-20 amperes at 8.6 volts is reached at 1400-1600 R.P.M. or 22-25 M.P.H.

Generator Data					
Cold Test 75° F.			Hot Test 175° F.		
Amperes	Volts	R.P.M.	Amperes	Volts	R.P.M.
18-20.....	8.2-8.62.....	1450	10-12.....	7.3-7.7.....	1600

Shunt field current is 1.8-2.3 amperes at 6 volts. Generator brush spring tension is 16-20 ounces.

**Mounting:**—Generator is mounted at right of engine and is driven by silent chain in tandem with the water pump. To remove generator, disconnect wire and remove three mounting nuts. Then pull generator to rear and lift from place.

**Oiling:**—Put 8 or 10 drops of light engine oil in each of the generator bearing oilers every two weeks or each 500 miles.

**RELAY:**—Model 266-N. Relay is mounted on the generator. Relay closes at 8-10 M.P.H. when generator voltage reaches 7.75 volts and opens with a discharge current of 0-2.5 amperes. Relay contacts separate .015-.025 inch. Air gap is .014-.021 inch with contacts closed.

**LIGHTING:**—Switch Model 486-D. Lighting switch is mounted at the lower end of the steering column. Head lights are 6-8 volt, 21-21 cp. (double filament-double contact). Stop light is 6-8 volt, 15 cp. S.C. Inspection light is 6-8 volt, 21 cp. S.C. Side, dash, tail, tonneau, dome, corner and step lights are each 6-8 volt, 3 cp. S.C.

**CIRCUIT BREAKER:**—Model 5759. A combination vibrating and lockout circuit breaker is mounted on the dash. The vibrating unit protects the lighting circuits. It begins to operate at 25-30 amperes limiting the current flow to 10-15 amperes. The lockout circuit breaker protects the horn, stop light, inspection light, cigar lighter and body lights. It opens the circuit when the current reaches 25-30 amperes and operates with a discharge current of less than 1 ampere.



# CHANDLER

**MODEL 65, SERIAL NOS. C-50001 UP**  
**PRODUCTION STARTED JULY, 1928**  
**AUTO-LITE GENERATING, STARTING SYSTEM**  
**AUTO-LITE IGNITION**

**BATTERY:**—Prest-O-Lite, Type A-613-JF. 6 volt, 13 plates. The positive (+) terminal is grounded. Starting capacity (20 minute rate) is 102 amperes for 20 minutes. Lighting capacity (5 ampere rate) is 5 amperes for 20 hours. Battery is mounted under the front floor boards on the left frame member.

**IGNITION:**—Coil Model IG-4064. The ignition coil is mounted on a bracket at front of engine block. Ignition current is 2 amperes at 6 volts with engine running and 5 amperes at 6 volts with engine stopped.

**Distributor Model IGB-4018.** Breaker contacts separate .022 inch with breaker arm on lobe of cam. Resurface contacts with a fine flat contact file or on a medium hard oilstone. Contact points may be adjusted by loosening lock nut on stationary point. Breaker arm spring tension is 17-20 ounces. Distributor is full automatic. Automatic advance begins at 400 R.P.M. of engine. Maximum automatic advance is 14 degrees (engine) reached at 2000 R.P.M.

**Mounting:**—Distributor is mounted on accessory bracket at right front of engine. To remove distributor, disconnect primary lead and remove distributor head with cables intact. Then remove set screw on side of distributor shaft and lift distributor from place.

**Oiling:**—Put a few drops of light engine oil in the oil cup on the side of the distributor shaft every month or each 1000 miles. Put a small bit of vaseline on the face of the breaker cam every month.

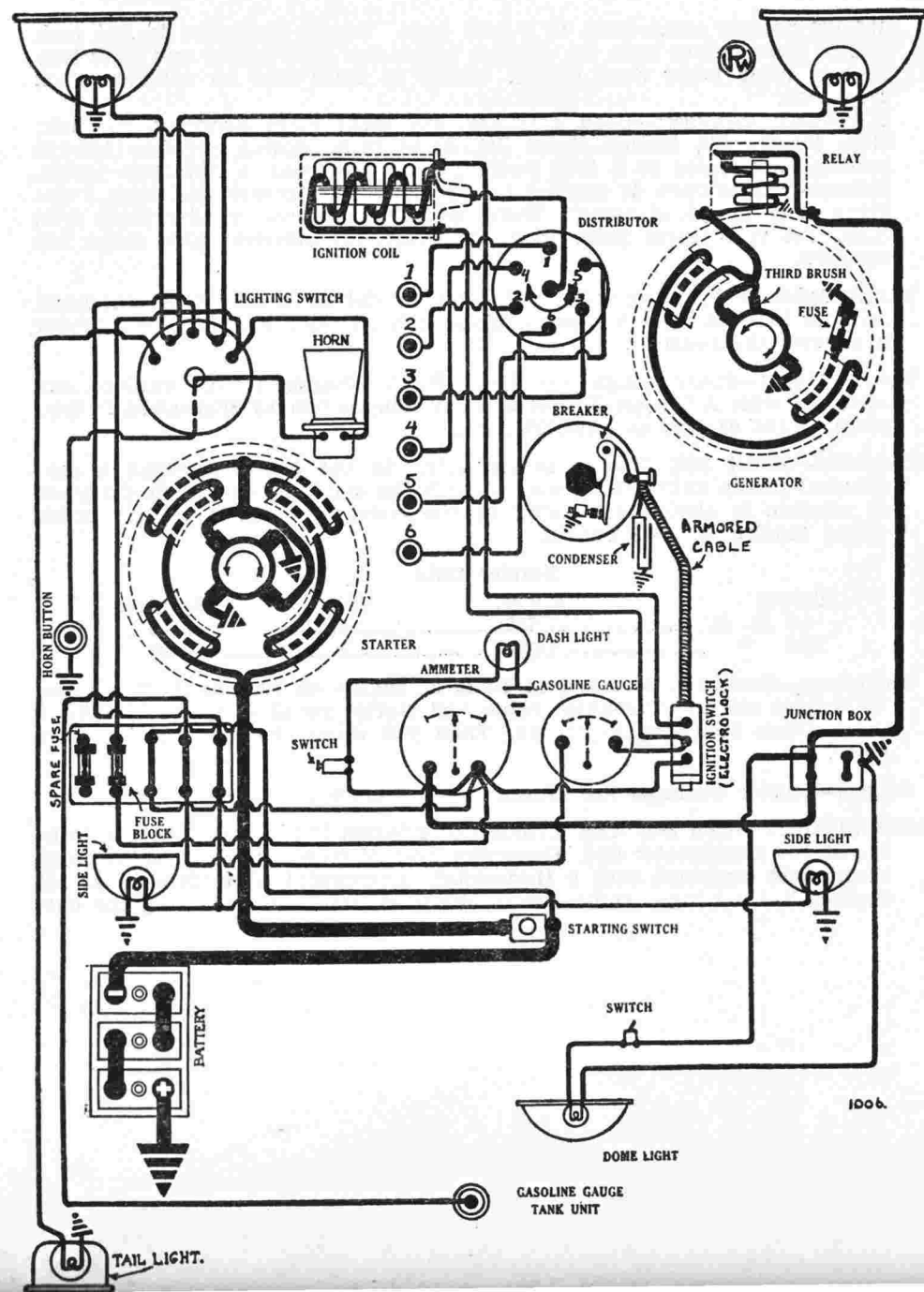
**Timing:**—Breaker contacts separate when piston entering power stroke reaches a position one tooth past top dead center with the breaker assembly in the fully retarded position. To set timing, crank engine over until piston No. 1 enters compression stroke. This is the upstroke with both valves closed. Continue to crank engine until piston No. 1 reaches top dead center when flywheel mark "DC-1 & 6" will be opposite the indicator mark on the flywheel housing. Continue to crank engine until a position one tooth past top dead center is reached. This is the firing point. If contacts do not separate at this point loosen the clamp screw and rotate the distributor until contacts begin to separate. Tighten the screw and make certain that the rotor is opposite the segment connected to the spark plug in cylinder No. 1 and connect the remaining plugs in order 5-3-6-2-4 around the distributor head.

**Firing Order:**—The firing order is 1-5-3-6-2-4. (No. 1 cylinder nearest the radiator.)

**Spark Plugs:**—Spark plugs are  $\frac{7}{8}$ -18 S.A.E. Standard. Gaps are .027 inch.

**VALVE TIMING:**—**INLET VALVES:**—Head diameter is  $1 \frac{15}{32}$  inches; stem diameter is  $\frac{5}{16}$  inch; stem length is  $5 \frac{1}{8}$  inches. Tappet clearance is .009 inch (cold) and .007 inch (hot). Spring pressure is 70 pounds compressed to  $1 \frac{17}{32}$  inches. Valve lift is  $\frac{5}{16}$  inch. Inlet valves open at top dead center and close at 54 degrees or 14 teeth on flywheel after lower dead center.

**EXHAUST VALVES:**—Head diameter is  $1 \frac{15}{32}$  inches; stem diameter is  $\frac{5}{16}$  inch; stem length is  $5 \frac{1}{8}$  inches. Tappet clearance is .009 inch (cold) and .007 inch (hot). Spring pressure is 70 pounds compressed to  $1 \frac{17}{32}$  inches. Valve lift is  $\frac{5}{16}$  inch. Exhaust valves open at 37 degrees or 12 teeth before lower dead center and close at 5 degrees or  $1 \frac{1}{2}$  teeth after



# CHANDLER

## MODEL 65, SERIAL NOS. C-50001 UP

### PRODUCTION STARTED JULY, 1928

### AUTO-LITE GENERATING, STARTING SYSTEM

### AUTO-LITE IGNITION

top dead center. Valve stem guides are removable. Oversize valve stems are not made.

**STARTER:—Model MN-4015.** Starter is connected to the engine through an inboard Bendix drive. The direction of rotation is counter-clockwise, looking at the commutator end. Brush spring tension is 24-28 ounces.

Starter Data			
Torque	R.P.M.	Volts	Amperes
11 lb. ft.....	Lock.....	4.....	550

**Mounting:—**Starter is flange mounted at left of engine on forward side of flywheel housing. To remove starter, disconnect cable and remove 3 flange mounting cap screws. Pull starter forward and lift from place.

**Oiling:—**Put 8 or 10 drops of light engine oil in each of the starter bearings oilers every 1000 miles or each month.

**GENERATOR:—Model GAL-4115.** The direction of rotation is counter-clockwise, looking at the commutator end. Generator current regulation is by third brush shunt field. To adjust generator output, remove commutator cover band and shift third brush and mounting bracket by tapping on mounting stud with screwdriver. Shift the third brush in a counter-clockwise direction to increase the charging rate and in the opposite direction to decrease the charging rate. The third brush is held in any position by friction between the mounting stud and the end plate. With standard car setting, the charging rate is 14 amperes (hot) reached at a speed of 20 miles per hour.

Generator Data					
Cold Test		R.P.M.	Hot Test		R.P.M.
Amperes	Volts		Amperes	Volts	
16-18.....	8.....	1600	14 .....	8.....	2000

Motoring, generator draws 6 amperes at 6 volts. Shunt field current is 4.4 amperes at 6 volts. Brush spring tension is 14-18 ounces.

**Mounting:—**Generator is flange mounted at right of engine on rear of accessory bracket. The water pump is driven by an extension of the generator shaft. To remove generator, disconnect lead and water pump coupling and remove 4 mounting bolts. Then pull generator to the rear and lift from place.

**Adjustment of Timing Chain:—**Timing chain is adjusted by loosening nuts holding generator and moving generator outward. Make adjustment with engine running and move generator until chain hums. Then slack up on chain tension until the noise disappears. Tighten the nuts. It is very important not to get too much tension on the chain. With correct setting the chain will operate noiselessly.

**Oiling:—**Put 8 or 10 drops of light engine oil in each of the generator oilers every month or each 1000 miles.

**RELAY:—Model CB-4014.** Relay is mounted on the generator. Relay closes at 500 R.P.M. when the generator voltage reaches 6.75-7.5 volts and opens with a current discharge of 0-2.5 amperes. Charging current at closing of contacts is approximately 2 amperes. Relay contacts separate .025-.035 inch. Air gap is .015-.020 inch with contacts closed.

**LIGHTING:—Clum Switch Model 10677.** Lighting switch is mounted at the base of the steering column. Head lights are 6-8 volt, 21-21 cp. (double filament-double contact). Mazda 1110. Stop, dash, tail and side lights are 6-8 volt, 3 cp, S.C. Mazda 63. Dome light is 6-8 volt, 6 cp. S.C. Mazda 81.

**FUSES:—**Lighting fuses are 20 ampere capacity and are located in the fuse block on the dash. Generator field fuse is 5 amperes and is located in the commutator end of the generator.

# CHANDLER

## MODEL 75, SERIAL NOS. 1001 UP PRODUCTION STARTED JULY, 1928 AUTO-LITE GENERATING, STARTING SYSTEM AUTO-LITE IGNITION

**BATTERY:**—Prest-O-Lite, Type A-615-JF. 6 volt, 15 plates. The positive (+) terminal is grounded. Starting capacity (20 minute rate) is 120 amperes for 20 minutes. Lighting capacity (5 ampere rate) is 5 amperes for 20 hours. Battery is mounted under front floor boards on right frame member.

**IGNITION:**—Coil Model IG-4064. Coil is mounted on bracket at front of engine block. Ignition current is 1 ampere at 6 volts with engine running and 2 amperes at 6 volts with engine stopped.

**Distributor Model IGH-4001A.** Breaker contacts separate .022 inch with breaker arm on lobe of cam. Resurface contacts on a fine flat contact file or on a medium hard oilstone. Breaker arm spring tension is 17-21 ounces. Breaker uses two sets of contacts on a single four sided cam. Contacts open alternately at intervals of 45 degrees corresponding to 90 degrees of crankshaft rotation. This is the correct firing interval for the Chandler engine and breaker must be accurately set. See Timing. Distributor is semi-automatic. Maximum manual advance is 16 degrees (engine). Automatic advance begins at 400 R.P.M. of engine. Maximum automatic advance is 15 degrees reached at 1450 R.P.M.

**Mounting:**—Distributor is mounted on the front of the generator at the right of the engine. To remove distributor, disconnect primary lead and manual advance rod and remove distributor head with cables intact. Then loosen distributor clamp screw and lift distributor from place.

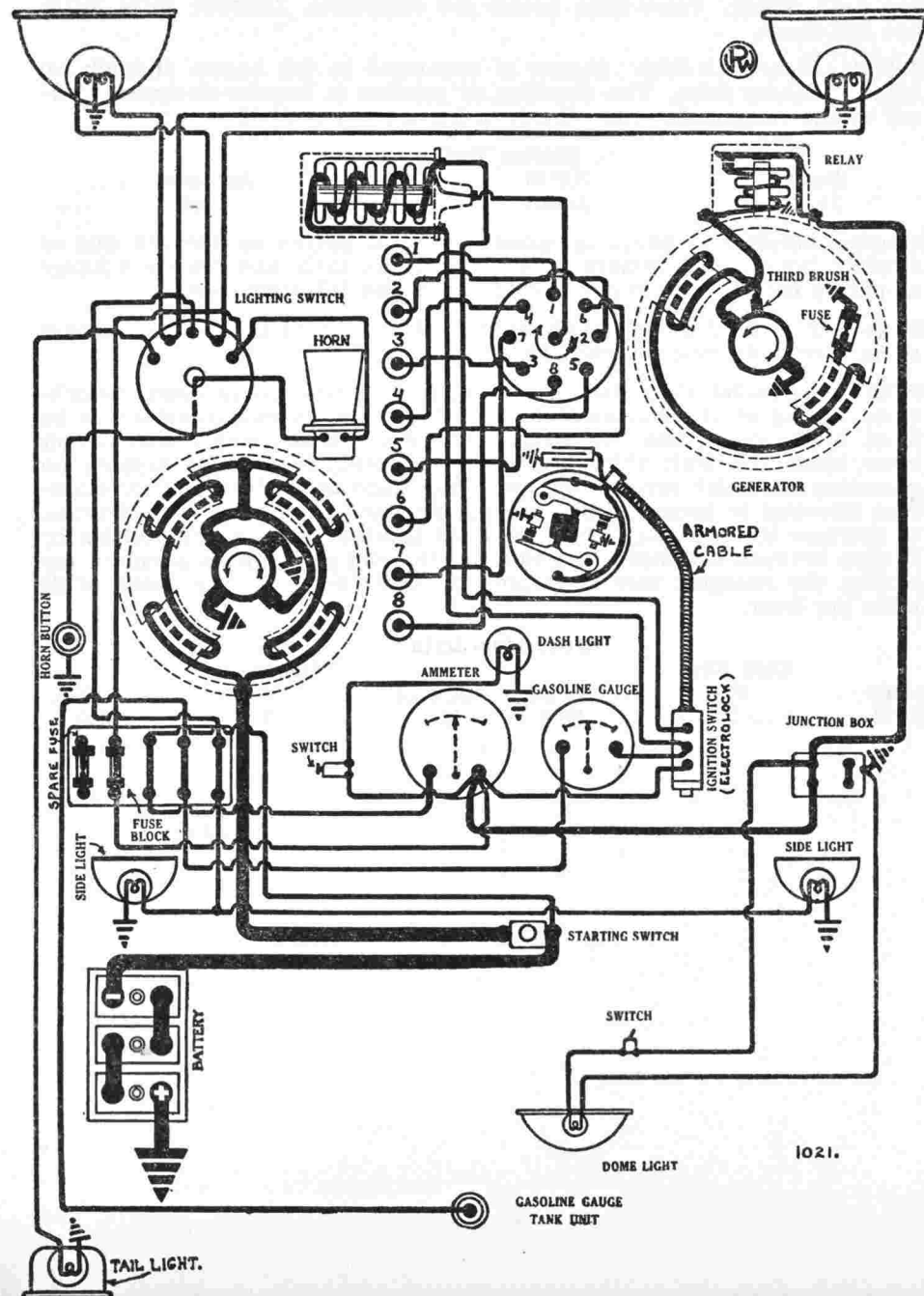
**Oiling:**—Fill the grease cup on the side of the distributor with medium cup grease and turn down one turn every month or each 1000 miles. Every month remove the distributor head and rotor and saturate the wick oiler in the center of the shaft with light oil. Put a small bit of vaseline on the face of the breaker cam each month.

**Timing:**—**Synchronization of Contacts.** To synchronize contacts, crank engine over 90 degrees from firing position of piston No. 1 when piston No. 6 will reach a position  $1\frac{1}{2}$  teeth on the flywheel before top dead center entering power stroke. (Dead center mark on flywheel for piston No. 6 is short line one-quarter turn of crankshaft after top dead center for piston No. 1.) The second set of contacts should separate at this point. If they do not, loosen the lock screws and turn the eccentric adjusting screw on breaker plate until contacts separate. Tighten the screw and check the gap with breaker arm on lobe of cam. If it is not within the limits of .018-.024 inch, reset at .022 inch and repeat synchronizing operation.

**Timing Distributor to Engine:**—Breaker contacts separate when piston entering power stroke reaches a position  $1\frac{1}{2}$  teeth on the flywheel before top dead center with the advance lever fully advanced. To set timing, crank engine over until piston No. 1 enters compression stroke. This is the upstroke with both valves closed. Fully advance spark lever. Continue to crank engine until a position  $1\frac{1}{2}$  teeth on the flywheel before top dead center is reached. (Top dead center is indicated by the mark "DC-1 & 8" on the flywheel.) Contacts should separate at this point. If they do not, loosen the lock screws and turn the eccentric adjusting screw until contacts separate. Tighten the screws and make certain that the rotor is opposite the segment connected to the spark plug in cylinder No. 1 and connect the remaining plugs in order 6-2-5-8-3-7-4 around the distributor head.

**Firing Order:**—The firing order is 1-6-2-5-8-3-7-4.

**Spark Plugs:**—Spark plugs are  $\frac{7}{8}$  S.A.E. Standard. Gaps are .027 inch.







# CHANDLER

BIG SIX, SERIAL NOS. 188001 UP  
PRODUCTION STARTED JULY 1928  
DELCO-REMY GENERATING, STARTING SYSTEM  
DELCO-REMY IGNITION

**BATTERY:**—Prest-O-Lite, Type A-615-JF, 6 volt, 15 plates. The positive (+) terminal is grounded. Starting capacity (20 minute rate) is 120 amperes for 20 minutes. Lighting capacity (5 ampere rate) is 5 amperes for 20 hours. Battery is mounted under front floor boards on right frame member.

**IGNITION:**—Coil Model 525-C. Coil is mounted on horn bracket at right front of engine. Ignition current is 2 amperes at 6 volts with engine running and 5 amperes at 6 volts with engine stopped.

**Distributor Model 641-C.** Breaker contacts separate .018-.024 inch. Resurface contacts with a fine flat contact file or on a medium hard oilstone. To adjust contact gap, loosen lock screw and turn eccentric adjusting screw until proper clearance is secured. Tighten the lock screw after making the adjustment. Breaker arm spring tension is 17-21 ounces. Distributor is semi-automatic. Maximum manual advance is 22 degrees. Automatic advance begins at 500 R.P.M. of engine. Maximum automatic advance is 30 degrees reached at 2300 R.P.M.

**Mounting:**—Distributor is mounted on the rear of the generator at the right of the engine. To remove distributor, disconnect primary lead and manual advance lever and remove distributor head with cables intact. Then remove set screw in side of shaft and lift distributor from place.

**Oiling:**—Fill the grease cup on the side of the distributor shaft and turn down one turn every month or each 1000 miles. Each month put a small bit of vaseline on the face of the breaker cam.

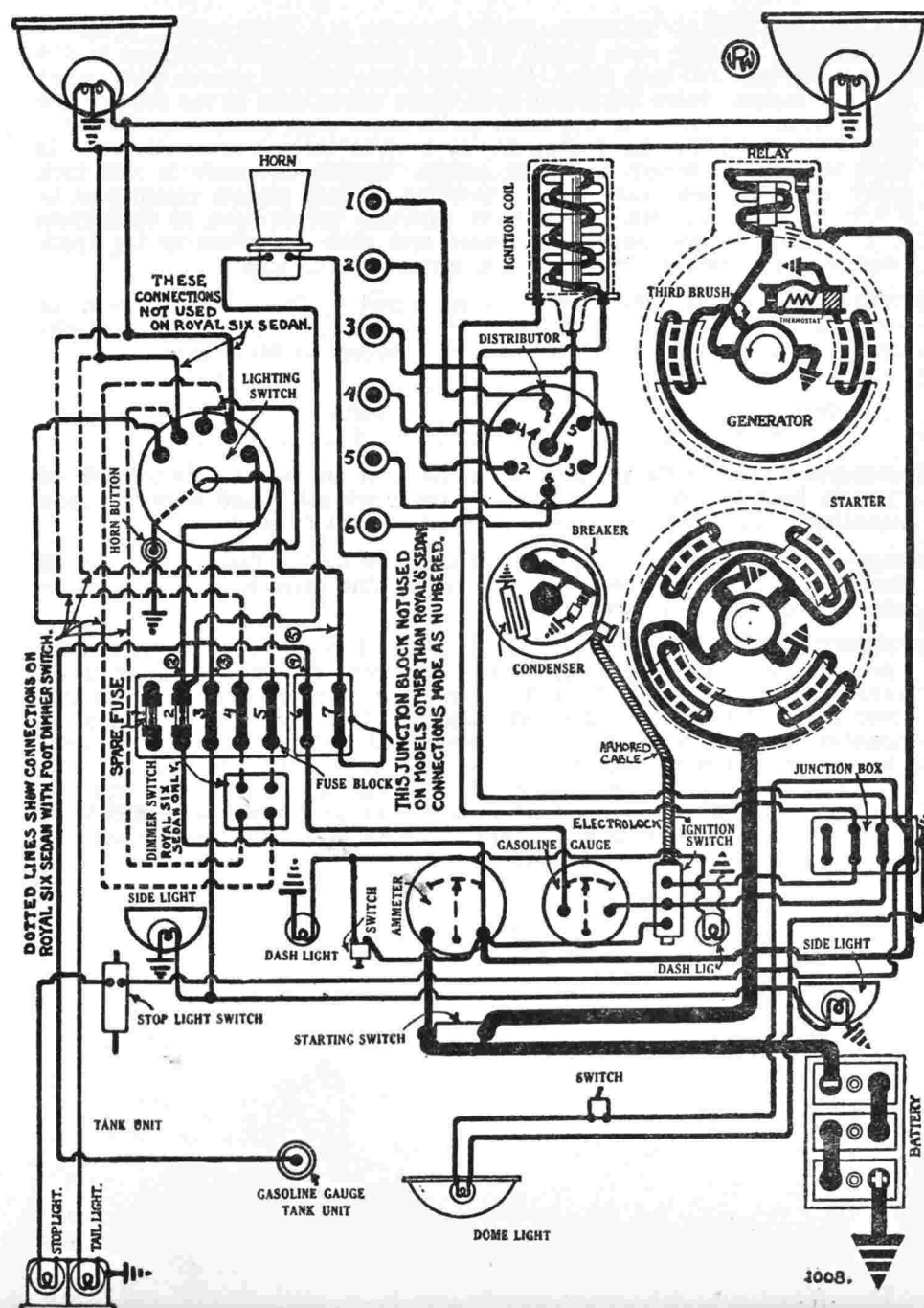
**Timing:**—Breaker contacts begin to separate when the piston entering power stroke reaches top dead center with the manual spark advance lever fully advanced. To set timing, crank engine until piston No. 1 enters compression stroke (the upstroke with both valves closed). Fully advance spark lever. Continue to crank engine until piston No. 1 reaches top dead center when the flywheel mark 'DC 1&6' will be directly opposite the pointer on the flywheel case. Then loosen advance arm clamp screw and rotate distributor until contacts begin to open. Tighten the clamp screw. Make certain that the segment opposite the rotor is connected to the spark plug in cylinder No. 1 and connect the remaining spark plugs in order 5-3-6-2-4 clockwise around the distributor head.

**Firing Order:**—The firing order is 1-5-3-6-2-4. No. 1 cylinder nearest the radiator.

**Spark Plugs:**—Spark plugs are  $\frac{7}{8}$ -18 S.A.E. Standard. Gaps are .027 inch.

**VALVE TIMING:**—**INLET VALVES:**—Head diameter is  $1\frac{23}{32}$  inches; stem diameter is  $\frac{3}{8}$  inch; stem length is  $6\frac{11}{16}$  inches. Tappet clearance is .009 inch (cold) and .007 inch (hot). Valve lift is  $\frac{5}{16}$  inch. Spring pressure is 92-97 pounds compressed to  $2\frac{3}{8}$  inches. Inlet valves open at top dead center and close at 34 degrees or 11 teeth on the flywheel after lower dead center. **EXHAUST VALVES:**—Head diameter is  $1\frac{23}{32}$  inches; stem diameter is  $\frac{3}{8}$  inch; stem length is  $6\frac{11}{16}$  inches. Tappet clearance is .009 inch (cold) and .007 inch (hot). Valve lift is  $\frac{5}{16}$  inch. Spring pressure is 92-97 pounds compressed to  $2\frac{3}{8}$  inches. Exhaust valves open 49 degrees or 15 teeth before lower dead center and close at 5 degrees or  $1\frac{1}{2}$  teeth after top dead center.

**STARTER:**—Model 720-W. Starter is connected to the engine through an out-board Bendix drive. The direction of rotation is counter-clockwise, looking



# CHANDLER

**BIG SIX, SERIAL NOS. 188001 UP**  
**PRODUCTION STARTED JULY 1928**  
**DELCO-REMY GENERATING, STARTING SYSTEM**  
**DELCO-REMY IGNITION**

at the commutator end. Starter switch is Model 405-C. Brush spring tension is 24-28 ounces.

Starter Data			
Torque	R.P.M.	Volts	Amperes
0 lb. ft.	6000	5	65
15 "	Lock	3.15	570

**Mounting:**—Starter is flange mounted at right of engine on forward side of flywheel housing under the crankcase flange. To remove starter, disconnect cable and remove flange mounting cap screws and stud extending through crank case flange. Then pull starter forward and lift from place.

**Oiling:**—Put 5 or 6 drops of light oil in the oiler on the commutator end of the starter every month or each 1000 miles. The drive end bearing is oil-less.

**GENERATOR:**—Model 944-C. The direction of rotation is counter-clockwise, looking at the commutator end of the generator. Current regulation is by third brush shunt field and thermostat. Thermostat contacts open at 165°F. cutting the resistance across the thermostat contacts in series with the field and reducing the output approximately 40%. To adjust generator output, loosen the small round headed screw on the generator end plate and remove the commutator cover band. Then shift the third brush in a counter-clockwise direction to increase the charging rate and in the opposite direction to decrease the charging rate. Tighten the screw after making the adjustment. With standard car setting, the maximum charging rate is 19 amperes (cold) reached at 1300 R.P.M. or 20 miles per hour.

## Generator Data

Cold Test			Hot Test		
Amperes	Volts	R.P.M.	Amperes	Volts	R.P.M.
18-20	8.5	1300	9-12	7.6	1400

Motoring, generator draws 6 amperes at 6 volts. Shunt field current is 5 amperes at 6 volts. Brush spring tension is 22-28 ounces.

**Mounting:**—Generator is base mounted on special bracket at right of engine and is driven by extension of water pump shaft. To remove generator, disconnect lead and water pump coupling. Remove distributor. Then remove nuts from two base mounting studs and lift generator from place.

**Oiling:**—Put 4 or 5 drops of light oil in each of the generator bearing oilers every month or each 1000 miles.

**RELAY:**—Model 265-B. Relay is mounted on the generator. Relay contacts close at 500 R.P.M. when the generator voltage reaches 6.75-7.5 volts and open with a discharge current of 0-2.5 amperes. Charging current at closing of contacts is approximately 2 amperes. Relay contacts separate .015-.025 inch. Air gap is .014-.021 inch with contacts closed.

**LIGHTING:**—Clum Switch Model 10677. Switch is located at lower end of steering column. Head lights are 6-8 volt, 21-21 cp. (double filament-double contact base using second 21 cp filament instead of dimming) Mazda No. 1110. Dome light is 6-8 volt, 6 cp. S.C. Mazda No. 81. Side, stop, dash and tail lights are each 6-8 volt, 3 cp. S.C. Mazda No. 63.

**FUSES:**—Fuses are 20 ampere capacity. Mounted on fuse block on dash.

# CHANDLER

MODEL 85, SERIAL NOS. E-108001 UP  
PRODUCTION STARTED JULY 1928  
DELCO-REMY GENERATING, STARTING SYSTEM  
DELCO-REMY IGNITION

**BATTERY:**—Prest-O-Lite, Type A-615-JF, 6 volt, 15 plates. The positive (+) terminal is grounded. Starting capacity (20 minute rate) is 120 amperes for 20 minutes. Lighting capacity (5 ampere rate) is 5 amperes for 20 hours. Battery is mounted under front floor boards on right frame member.

**IGNITION:**—Coil Model 525-C. Ignition current is 2 amperes at 6 volts with engine running and 5 amperes at 6 volts with engine stopped. Coil is mounted in the right front frame channel.

**Distributor Model 658-G.** Breaker contacts separate .022 inch with breaker arm on lobe of cam. Set contact gap by loosening lock screw on stationary contact plate and turning eccentric adjusting screw until proper setting is secured. Resurface contacts with a fine flat contact file or on a medium hard oilstone. Breaker arm spring tension is 17-21 ounces. Breaker uses two sets of contacts on a single four sided cam. Contacts open alternately at intervals of 45 degrees corresponding to 90 degrees of crankshaft rotation. This is the correct firing interval for the Chandler engine and breaker must be accurately set. See Timing. Distributor is semi-automatic. Maximum manual advance is 16 degrees (engine). Automatic advance begins at 400 R.P.M. of engine. Maximum automatic advance is 15 degrees reached at 1450 R.P.M.

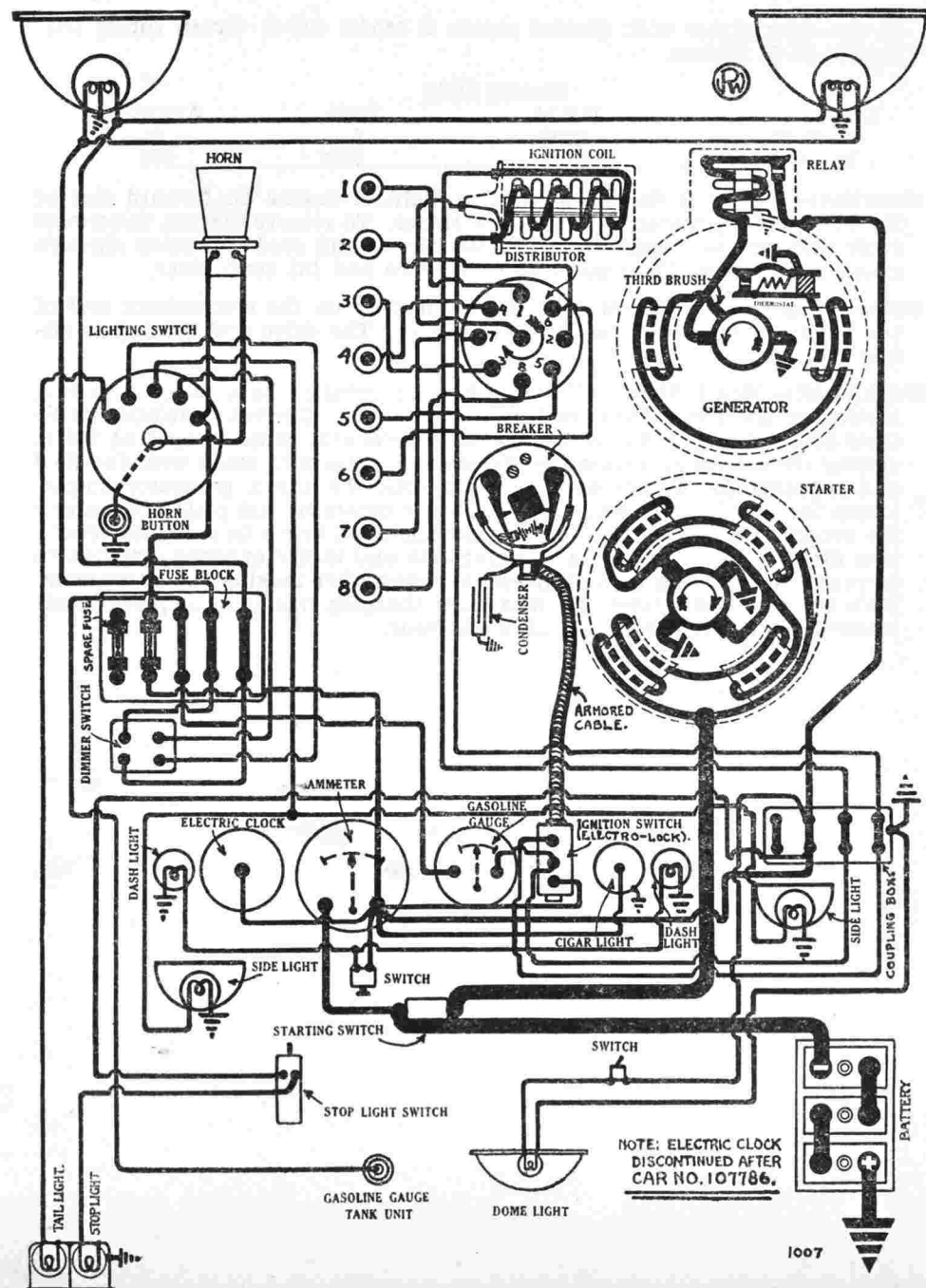
**Mounting:**—Distributor is mounted on the front of the generator at the right of the engine. To remove distributor, disconnect primary lead and manual advance rod and remove distributor head with cables intact. Then loosen distributor clamp screw and lift distributor from place.

**Oiling:**—Fill the grease cup on the side of the distributor shaft and turn down one turn every month or each 1000 miles. Every month remove the distributor head and rotor and saturate the wick oiler in the center of the shaft with light oil. Put a small bit of vaseline on the breaker cam.

**Timing:**—Synchronization of Contacts:—Use Delco-Remy Tool, Part No. 820738, and follow directions on Page S-31. Contacts can be synchronized without tool after distributor has been timed to engine by cranking engine over 90 degrees from firing position of piston No. 1 when piston No. 6 will reach a position  $\frac{1}{2}$  tooth past top dead center entering power stroke. The second set of contacts should separate at this point. If they do not, loosen lock screws and turn eccentric adjusting screw on breaker plate until contacts begin to open. Tighten the lock screw and check the contact gap with the breaker arm on the lobe of the cam. If it is not within limits of .018-.024 inch, reset at .022 inch and repeat synchronizing operation.

**Timing Distributor to Engine:**—Breaker contacts begin to separate when the piston entering power stroke reaches top dead center with the manual advance lever fully advanced. To set timing, crank engine until piston No. 1 enters compression stroke (the upstroke with both valves closed). Fully advance spark control lever. Continue to crank engine until piston No. 1 reaches a position  $\frac{1}{2}$  tooth past top dead center when the flywheel mark 'DC 1&8' will be approximately opposite the indicator on the flywheel case. Loosen advance arm clamp screw and turn distributor housing until contacts begin to separate. Tighten the clamp screw. Make certain that the rotor is opposite the segment connected to the spark plug in cylinder No. 1 and connect the remaining spark plugs in order 6-2-5-8-3-7-4 clockwise around the distributor head.

**Firing Order:**—The firing order is 1-6-2-5-8-3-7-4. No. 1 cylinder nearest the radiator.





# CHANDLER

MODEL 85, SERIAL NOS. E-108001 UP  
PRODUCTION STARTED JULY 1928  
DELCO-REMY GENERATING, STARTING SYSTEM  
DELCO-REMY IGNITION

**Spark Plugs:**—Spark plugs are  $\frac{7}{8}$ -18 S.A.E. Standard. Gaps are .027 inch.

**VALVE TIMING:**—**INLET VALVES:**—Head diameter is 1  $\frac{23}{32}$  inches; stem diameter is  $\frac{3}{8}$  inch; stem length is 6  $\frac{15}{32}$  inches. Tappet clearance is .009 inch. Valve lift is  $\frac{5}{16}$  inch. Spring pressure is 95 pounds. Inlet valves open at top dead center and close at 35 degrees after lower dead center.

**EXHAUST VALVES:**—Head diameter is 1  $\frac{19}{32}$  inches; stem diameter is  $\frac{3}{8}$  inch; stem length is 6  $\frac{15}{32}$  inches. Tappet clearance is .009 inch. Valve lift is  $\frac{5}{16}$  inch. Spring pressure is 95 pounds. Exhaust valves open at 48 degrees before lower dead center and close at 5 degrees after top dead center. Valve stem guides are removable. Oversize valves are not made.

**STARTER:**—**Model 727-A.** Starter is connected to the engine through reduction gears and an outboard Bendix drive. The direction of rotation of the armature shaft is clockwise, looking at the commutator end. Starter switch is Model 405-C. Brush spring tension is 24-28 ounces.

Starter Data			
Torque	R.P.M.	Volts	Amperes
0 lb. ft. ....	2500 .....	5 .....	70
28 " .....	Lock .....	3 .....	600

**Mounting:**—Starter is flange mounted at right of engine on forward side of flywheel housing. To remove starter, disconnect cable and remove flange mounting studs. Then pull starter forward and lift from place.

**Oiling:**—Put 8 or 10 drops of light oil in each of the starter bearing oilers every two weeks or each 500 miles. Every six months remove the grease plug in the reduction gear compartment and repack gears with medium cup grease.

**GENERATOR:**—**Model 944-D.** The direction of rotation is counter-clockwise, looking at the commutator end. Generator current regulation is by third brush shunt field and thermostat. Thermostat contacts open at 165°F. cutting the resistance across the thermostat contacts in series with the shunt field and reducing the output approximately 40%. To adjust generator output, loosen the small round headed screw on the generator end plate and remove the commutator cover band. Then shift the third brush in a counter-clockwise direction to increase the charging rate and in the opposite direction to decrease the charging rate. Tighten the screws after making

the adjustment. With standard car setting, maximum charging rate is 17 amperes reached at 1300 R.P.M. or 20 miles per hour.

Generator Data					
Cold Test			Hot Test		
Amperes	Volts	R.P.M.	Amperes	Volts	R.P.M.
19 .....	8.5 .....	1300	12 .....	7.65 .....	1500

Motoring, generator draws 6 amperes at 6 volts. Shunt field current is 5 amperes at 6 volts. Brush spring tension is 16-18 ounces.

**Mounting:**—Generator is flange mounted at right of engine on rear of timing chain case. To remove generator, disconnect generator lead and remove distributor. Then remove 3 flange mounting cap screws and slide generator to the rear. Make certain that timing chain does not slip off generator drive sprocket as this will throw off valve timing of engine.

**Adjustment of Timing Chain:**—Timing chain is adjusted by loosening two upper flange mounting screws and moving generator outward. Make adjustment with engine running and move generator until chain hums. Then slack up on chain tension until the noise disappears. Tighten the cap screws. It is very important not to get too much tension on the chain. With correct setting chain will operate noiselessly.

**Oiling:**—Put 8 or 10 drops of light oil in each of the generator bearing oilers every month or each 1000 miles.

**RELAY:**—**Model 265-B.** Relay is mounted on the generator. Relay contacts close at 500 R.P.M. when the voltage of the generator reaches 6.75-7.5 volts and open with a discharge current of 0-2.5 amperes. Charging current at closing of contacts is approximately 2 amperes. Relay contacts separate .015-.025 inch. Air gap is .014-.021 inch with contacts closed.

**LIGHTING:**—**Clum Switch Model 10677.** Switch is mounted at lower end of steering column. Head lights are 6-8 volt, 21-21 cp. (double filament-double contact base using second 21 cp. filament instead of dimming) Mazda 1110. Stop light is 6-8 volt, 3 cp. S.C. Mazda No. 63. Dash, tail, side and corner lights are each 6-8 volt, 3 cp. S.C. Mazda No. 63.

**FUSES:**—Lighting fuses are 20 amperes capacity. Mounted on fuse block on dash.



# CHRYSLER

## MODEL "65" (1929), SERIAL NOS. LS400P

### DELCO-REMY GENERATING, STARTING SYSTEM DELCO-REMY IGNITION

**BATTERY:**—Willard, Type CWR-15. 6 volt. The positive (+) terminal is grounded. Starting capacity (20 minute rate) is 114 amperes for 20 minutes. Lighting capacity (5 ampere rate) is 5 amperes for 20 hours. The battery is mounted under the front floor boards on the left frame member.

**IGNITION:**—Coil Model 525-E. Distributor Model 631-B. Breaker contacts separate .018-.024 inch. They are made of tungsten. Resurface contacts with a fine flat contact file or on a medium hard oilstone. Distributor is semi-automatic. Manual advance is 25 degrees (engine). Automatic advance begins at 400 R.P.M. Maximum automatic advance is 18 degrees reached at 2540 R.P.M. Breaker arm spring tension is 17.5-20.5 ounces.

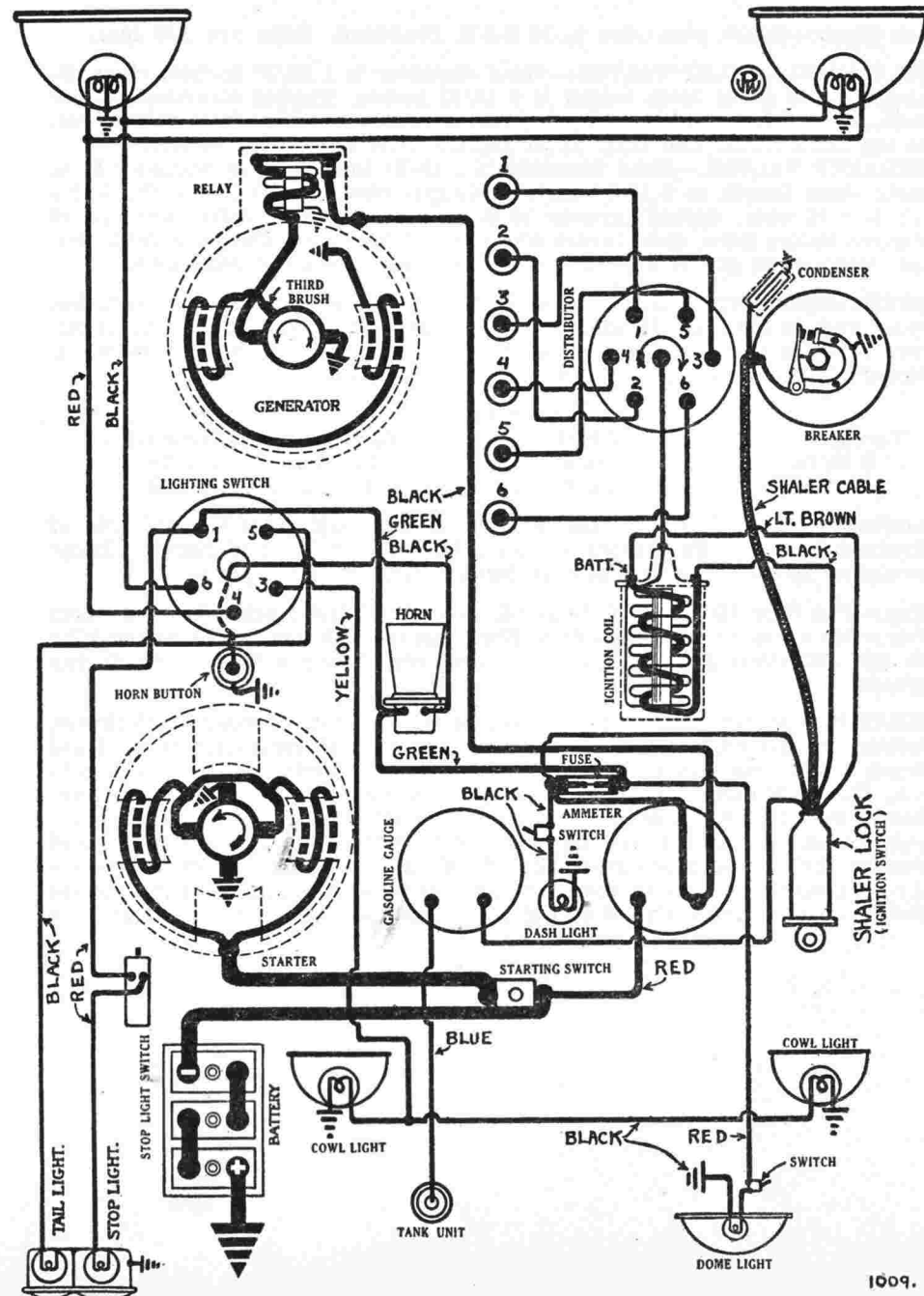
**Mounting:**—Distributor is mounted on top of the cylinder head. To remove distributor disconnect manual advance rod and remove manual advance stop screw. Then lift distributor from place. Coil is mounted on the dash.

**Oiling:**—Fill the grease cup under the distributor head with medium cup grease and turn down two turns every month or each 1000 miles if the car is driven more than 1000 miles a month.

**Timing:**—To time the distributor to the engine remove the  $\frac{1}{8}$  inch pipe plug from the cylinder head, above No. 6 piston, and screw a micrometer gauge into the tapped hole. Take a small 6 volt test lamp and connect one terminal to the distributor primary terminal and the other side to the battery terminal of the relay. If the relay is not connected to a battery, connect lamp to one terminal of a battery and ground the other terminal of the battery to the engine. When the points are closed the test lamp will burn, but when they are open the circuit is broken and the lamp will go out. Set the distributor at the full manual advance point. Turn the engine over and locate the dead center point, setting the micrometer gauge on zero at the dead center point. Next, turn the engine over, coming up on the compression stroke on No. 1 cylinder and stop with the piston .020 inch before top dead center, on a standard head engine with a ratio of 5.2 to 1 or .015 inch before top dead center on a high compression head engine with a ratio of 6 to 1. While doing this press the distributor rotor back against the direction of rotation so as to remove all back lash in the driving mechanism. See that the rotor is opposite the segment connected to spark plug No. 1. Loosen the screw which clamps the distributor timing lever to the distributor and rotate the distributor until No. 1 cam begins to open the breaker points, i.e., until the lamp goes out. Tighten the clamp and reinstall the spark plug wires. To check timing, turn engine over two or three times then come up again on No. 1 compression stroke, tapping the crank lightly until the lamp goes out. If the dial gauge reads within the limits of .015-.025 inch on a standard head engine and .010-.020 inch on a high compression head engine the timing is satisfactory. If outside these limits it should be reset.

**VALVE TIMING:**—**INLET VALVES:**—Head diameter, 1  $\frac{15}{32}$  inches; stem diameter,  $\frac{11}{32}$  inch; stem length, 4  $\frac{31}{32}$  inches. Tappet clearance is .004 inch (hot). Spring pressure is 72 pounds with valves open and 44 pounds with valves closed. Valve lift is  $\frac{5}{16}$  inch. Inlet valves open at 6 degrees after top dead center and close at 46 degrees after lower dead center.

**EXHAUST VALVES:**—Head diameter, 1  $\frac{15}{32}$  inches; stem diameter,  $\frac{11}{32}$  inch; stem length, 4  $\frac{31}{32}$  inches. Tappet clearance is .006 inch (hot). Spring pressure is 72 pounds with valves open and 44 pounds with valves



# CHRYSLER

## MODEL "65" (1929), SERIAL NOS. LS400P DELCO-REMY GENERATING, STARTING SYSTEM DELCO-REMY IGNITION

closed. Exhaust valves open at 42 degrees before lower dead center and close 8 degrees after top dead center. Valve stem guides are removable. Oversize valve stems are not made.

**Firing Order:**—The firing order is 1-5-3-6-2-4.

**Spark Plugs:**—Spark plugs are A.C.  $\frac{7}{8}$  inch. Gaps are .027-.030 inch.

**STARTER:**—Model 714-D. Starter is connected to the engine through a Bendix drive. The direction of rotation is counter-clockwise, looking at the commutator end. Starter brush spring tension is 24-28 ounces.

Starter Data			
Torque	R.P.M.	Volts	Amperes
0 lb. ft.	4100	5.6	75
3 " "	1500	5	200
6 " "	800	4.5	300
9.4 " "	350	4	400
12.8 " "	Lock	3.5	500

**Mounting:**—Starter is barrel mounted at left of flywheel housing. To remove starter, remove pilot screw on top of housing and slide starter from position.

**Oiling:**—Put 4 or 5 drops of light engine oil in the oiler on the commutator end of the starter every month or each 1000 miles if the car is driven more than 1000 miles in a month.

**GENERATOR:**—Model 943-H. The direction of rotation is counter-clockwise, looking at the commutator end. Generator current regulation is by third brush shunt field. To adjust generator output, loosen small round headed screw on generator end plate and remove commutator cover band. Then shift third brush in a counter-clockwise direction to increase the charging

rate and in the opposite direction to decrease the charging rate. Tighten the screw after making the adjustment.

Generator Data					
Cold Test			Hot Test		
Amperes	Volts	R.P.M.	Amperes	Volts	R.P.M.
7.4	7.4	1000	6	7.05	1100
13	7.8	1375	10	7.45	1500
16	8.2	1800	12	7.7	2000
11.8	7.65	2750	10.4	7.5	2500

Shunt field is 5 amperes at 6 volts. Brush spring tension is 16-18 ounces. Motoring generator draws 6 amperes at 6 volts.

**Mounting:**—Generator is mounted on the left to the front of the engine and is driven by a belt from the crankshaft. To remove generator, loosen nut on belt adjustment clamp and swing generator to the side. Remove flange mounting cap screws and lift generator from place.

**Oiling:**—Put 4 or 5 drops of light engine oil in the generator oilers every two weeks or each 500 miles.

**RELAY:**—Model 265-B. Relay is mounted on top of the generator. Relay closes when the voltage of the generator reaches 7.25 volts and opens with a discharge current of 0-2.5 amperes. Relay contacts separate .020 inch. Air gap between relay armature and coil core is .016 inch with contacts closed.

**LIGHTING:**—Clum Switch Model 10738. Lighting switch is mounted at the base of the steering column. Head lights are 6-8 volt, 21-21 cp. (double filament-double contact). Side lights are 6-8 volt, 3 cp. D.C. Dash light is 6-8 volt, 3 cp. D.C. Tail and stop lights are 6-8 volt, 21-2 cp. D.C. Dome light is 6-8 volt, 15 cp. S.C.

**FUSES:**—Lighting fuses are mounted on the dash and are 20 ampere capacity.

# CHRYSLER

## MODEL "75" (1929), SERIAL NOS. CY050P

### DELCO-REMY GENERATING, STARTING SYSTEM DELCO-REMY IGNITION

**BATTERY:**—Willard, Type CWR-17. 6 volt. The positive (+) terminal is grounded. Starting capacity (20 minute rate) is 130 amperes for 20 minutes. Lighting capacity (5 ampere rate) is 5 amperes for 23.4 hours. The battery is mounted under the front floor boards on the left frame member.

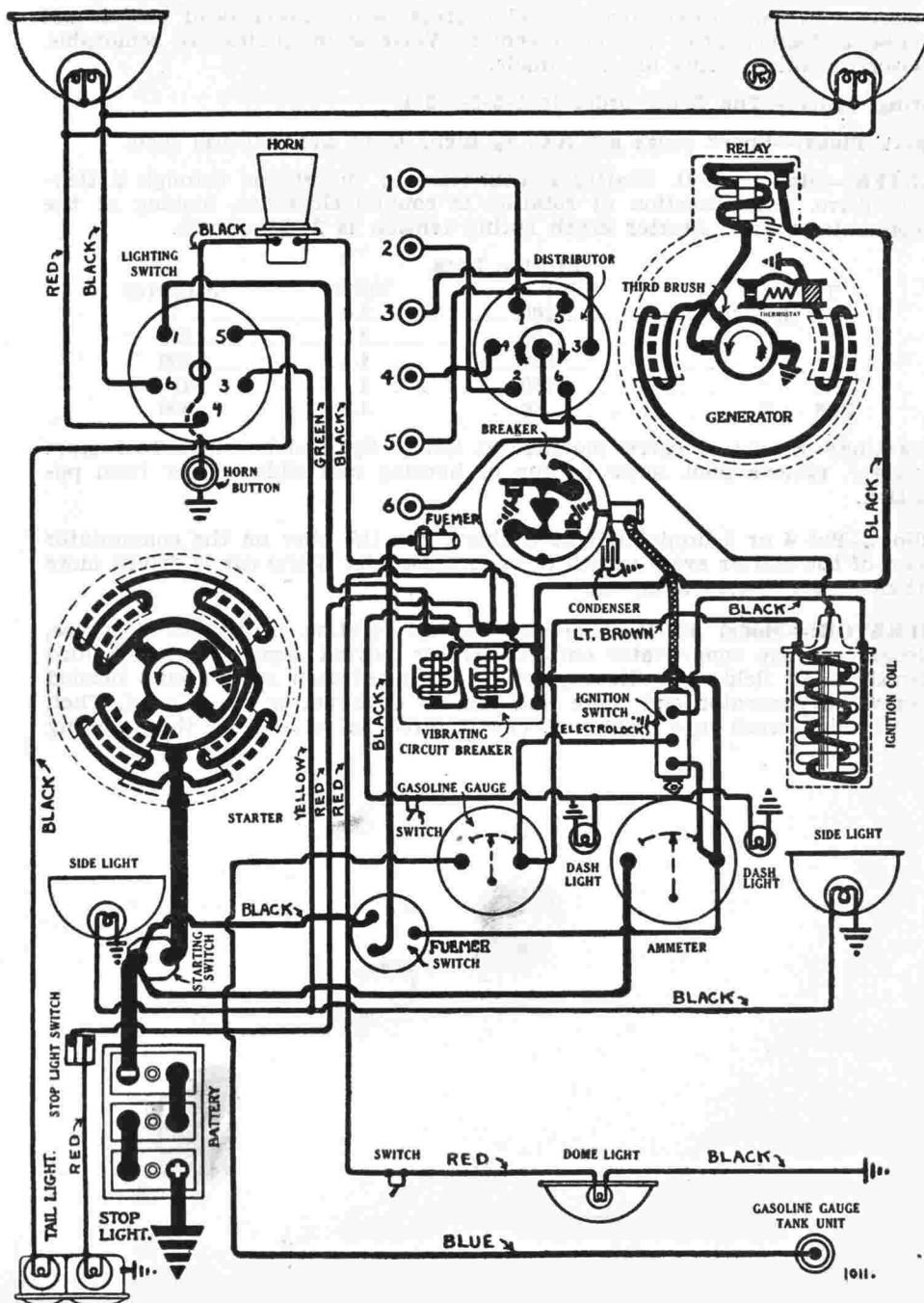
**IGNITION:**—Coil Model 525-E. Distributor Model 659-B. Breaker contacts separate .022 inch with breaker arm on lobe of cam. To set contact opening, loosen lock screw on stationary contact plate and turn eccentric adjusting screw until proper contact opening is secured. Resurface contacts with a fine flat contact file or on a medium hard oil stone. Breaker arm spring tension is 17.5 to 20.5 ounces. The breaker has two sets of breaker contacts on a three sided cam opening alternately at intervals of 60 degrees corresponding to 120 degrees of crankshaft rotation. This firing interval is very important and must be accurately set. See Timing. Distributor is semi-automatic. Maximum manual advance is 25 degrees (engine). Automatic advance begins at 400 R.P.M. of engine. Maximum automatic advance is 22 degrees (engine) reached at 2900 R.P.M. An Electrolock is used on the distributor. Whenever the distributor requires service, the entire distributor and Electrolock should be removed as a unit and replaced. Ignition current is 2 amperes at 6 volts with engine running and 5 amperes at 6 volts with engine stopped. Coil is mounted on the dash.

**Mounting:**—The distributor is mounted on top of the cylinder block. To remove distributor, disconnect manual advance rod and remove head with cables intact. Remove manual advance stop screw and lift distributor from place. The distributor and Electrolock must be removed as a unit.

**Oiling:**—Fill the grease cup under the distributor head with medium cup grease and turn down two turns every 500 miles. Put a small bit of vaseline on the face of the breaker cam every 500 miles.

**Timing:**—**Synchronization of Contacts:**—Use Delco-Remy Tool, Part No. 829751, and follow direction on Page S-30. Connect a 6 volt lamp in series with primary circuit at coil to accurately determine when contacts open. The lamp will go out at the instant the contacts separate. After synchronizing contacts, check contact opening. If it is not within the limits of .018-.024 inch, reset at .022 inch and repeat synchronizing operation.

**Timing Distributor to Engine:**—Remove the  $\frac{1}{8}$  inch pipe plug from the cylinder head, above No. 6 piston, and screw a micrometer gauge into the tapped hole. Connect the 6 volt test lamp to the distributor primary terminal and the battery terminal of the relay. If the relay is not connected to a battery, connect lamp to one terminal of a battery and ground the other terminal of the battery to the engine. When the points are closed the test lamp will burn, but when they are open the circuit is broken and the lamp will go out. Set the distributor at the full manual advance point. Turn the engine over and locate the dead center point, setting the micrometer gauge on zero at the dead center point. Turn the engine over again till it is coming up on the compression stroke on piston No 1 and stop with the piston .067 inch before top dead center on standard head engines with a ratio of 5.1 to 1 and .004 inch before top dead center on high compression head engines with a ratio of 6.2 to 1. While doing this press the distributor rotor back against the direction of rotation so as to remove all back lash in the drive mechanism. Make sure the rotor is opposite the segment connected to spark plug No. 1. Loosen the screw which clamps the distributor timing lever to the distributor and rotate the distributor until No 1 cam begins to open the breaker points, i.e., until the lamp goes out. Then tighten the screw and reinstall the spark plug





# CHRYSLER

## MODEL "75" (1929), SERIAL NOS. CYO50P DELCO-REMY GENERATING, STARTING SYSTEM DELCO-REMY IGNITION

wires. To check ignition timing turn over engine two or three times then come up again on No. 1 compression stroke, tapping the crank lightly until the lamp goes out. If the dial reads between the limits of .060 to .075 inch on a standard head engine or .002 to .005 inch on a high compression head engine the timing is satisfactory. If outside these limits, it should be reset.

**Firing Order:**—The firing order is 1-5-3-6-2-4.

**Spark Plugs:**—Spark plugs are Chapion  $\frac{7}{8}$  inch. Gaps are .027-.030 inch.

**VALVE TIMING:**—**INLET VALVES:**—Head diameter,  $1\frac{1}{8}$  inch; stem diameter,  $11/32$  inch; stem length,  $6\frac{7}{16}$  inches. Tappet clearance is .005 inch (hot). Spring pressure is 82 pounds with valves open and 52 pounds with valves closed. Valve lift is  $5/16$  inch. Intake valves open at 6 degrees after top dead center and close at 46 degrees after lower dead center.

**EXHAUST VALVES:**—Head diameter,  $1\frac{19}{32}$  inches; stem diameter,  $11/32$  inch; stem length,  $6\frac{7}{16}$  inches. Tappet clearance is .007 inch (hot). Spring pressure is 82 pounds with valves open and 62 pounds with valves closed. Valve lift is  $5/16$  inch. Exhaust valves open at 42 degrees before lower dead center and close 8 degrees after top dead center. Valve stem guides are removable. Oversize valve stems are not made.

**STARTER:**—Model 728-B. Starter is connected to the engine through a manual pinion shift. The direction of rotation is counter-clockwise, looking at the commutator end. Brush spring tension is 24-28 ounces each.

Starter Data			
Torque	R.P.M.	Volts	Amperes
0 lb. ft.	2500	5	70
28 "	Lock	3	600

**Mounting:**—Starter is mounted at left of engine on forward side of flywheel housing. To remove starter, disconnect starter cable and remove the large pilot mounting screw and lock nut. Then slide starter forward and lift from place.

**Oiling:**—Put 4 or 5 drops of light engine oil in starter bearing oilers every 1000 miles. Once each year remove grease plug in gear compartment and repack gears with medium grease.

**GENERATOR:**—Model 955-F. The direction of rotation is counter-clockwise, looking at the commutator end. Generator current regulation is by third brush shunt field. To adjust generator output, loosen the small round

headed screw on the generator end plate and remove the commutator cover band. Then shift the third brush in a counter-clockwise direction to increase the charging rate and in the opposite direction to decrease the charging rate. Tighten the screw after making the adjustment.

### Generator Data

Cold Test			Hot Test		
Amperes	Volts	R.P.M.	Amperes	Volts	R.P.M.
6	7.1	775	6	7.1	1000
13.2	7.8	1125	11	7.6	1500
16	8.1	1500	12	7.7	1800
14	7.8	2000	9.6	7.4	2500

Shunt field current is 4-6.1 amperes at 6 volts. Generator brush tension should be 14-16 ounces.

**Mounting:**—Generator is mounted at right of engine by a No. 3 S.A.E. flange mounting to the timing gear chain case. To remove generator, remove cover plate on front of case and remove three nuts holding generator in place. Then slide generator to rear, removing chain, but being careful that chain does not slip over cam shaft sprocket, or engine timing will be disturbed.

**Oiling:**—Put 8 or 10 drops of light engine oil in each of the generator oilers every month or each 1000 miles if the car is run more than 1000 miles a month.

**RELAY:**—Model 265-B. Relay is mounted on top of generator. Relay closes when generator reaches 600 R.P.M. with a terminal voltage of 7.25 volts and opens at approximately 500 R.P.M. with a discharge current of 0-2.5 amperes. Relay contacts separate .020 inch. Air gap is .016 inch with contacts closed.

**LIGHTING:**—Clum Switch Model 10738. Lighting switch is mounted at the base of the steering column. Head light are 6-8 volt, 21-21 cp. (double filament-double contact). Mazda 1110. Side lights are 6-8 volt, 3 cp. D.C. Mazda 64. Dash light is 6-8 volt, 3 cp. D.C. Mazda 64. Tail light is 6-8 volt, 3 cp. S.C. Mazda 63. Stop light is 6-8 volt, 15 cp. S.C. Mazda 87. Dome and corner lights are 6-8 volt, 15 cp. S.C. Mazda 87.

**CIRCUIT BREAKER:**—Model 410-B. Lighting circuits are protected by a circuit breaker mounted on the dash. Circuit breaker begins to operate with a current of 25-30 amperes limiting the current to 15 amperes.

# CHRYSLER

## MODEL "80-L" (1929), SERIAL NOS. CONTINUED

### DELCO-REMY GENERATING, STARTING SYSTEM DELCO-REMY IGNITION

**BATTERY:**—Willard, Type SJWR-6. 6 volt. The positive (+) terminal is grounded. Starting capacity (20 minute rate) is 166 amperes for 20 minutes. Lighting capacity (5 ampere rate) is 5 amperes for 30.6 hours. The battery is mounted under the front floor boards on the left frame member.

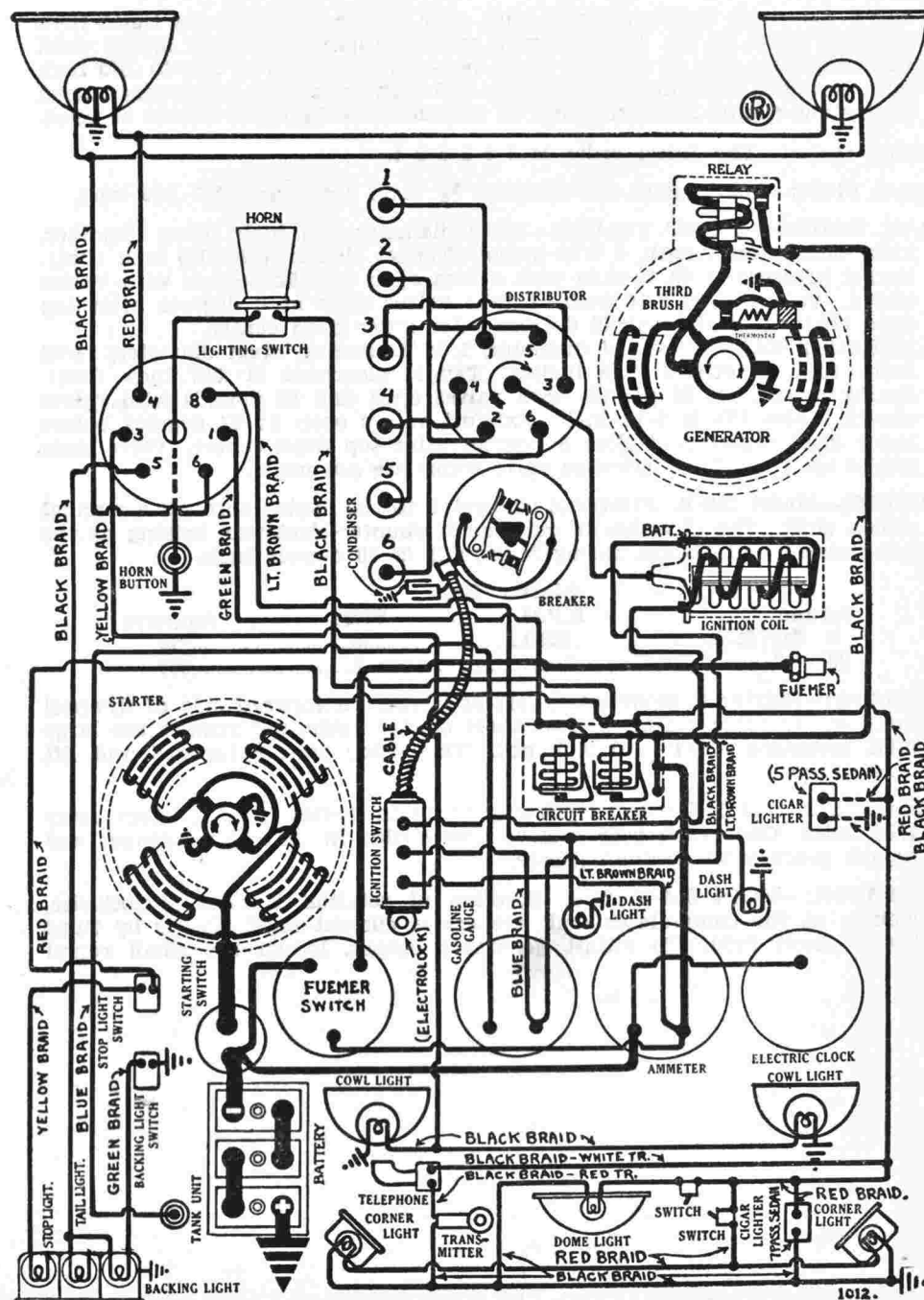
**IGNITION:**—Coil Model 525-E. Distributor Model 659-B. Breaker contacts separate .022 inch with breaker arm on lobe of cam. To set contact opening, loosen lock screw on stationary contact plate and turn eccentric adjusting screw until proper contact opening is secured. Resurface contacts with a fine flat contact file or on a medium hard oilstone. Breaker arm spring tension is 17.5-20.5 ounces. The breaker has two sets of breaker contacts on a three sided cam opening alternately at intervals of 60 degrees corresponding to 120 degrees of crankshaft rotation. This firing interval is very important and must be accurately set. See Timing. Distributor is semi-automatic. Maximum manual advance is 25 degrees (engine). Automatic advance begins at 400 R.P.M. of engine. Maximum automatic advance is 22 degrees (engine) reached at 2900 R.P.M. An Electrolock is used on the distributor. Whenever the distributor requires service, the entire distributor and Electrolock should be removed as a unit and replaced. The ignition current is 2 amperes at 6 volts with engine running and 5 amperes at 6 volts with engine stopped.

**Mounting:**—The coil is mounted on the dash. Distributor is mounted on top of cylinder block. To remove distributor, disconnect manual advance rod and remove head with cables intact. Remove manual advance stop screw and lift distributor from place. The distributor and Electrolock must be removed as a unit.

**Oiling:**—Fill the grease cup under the distributor head with medium cup grease and turn down two turns every 500 miles. Put a small bit of vaseline on the face of the breaker cam every 500 miles.

**Timing:**—**Synchronization of Contacts.** Use Delco-Remy Tool, Part No. 829751, and follow directions on Page S-31. Connect a 6 volt lamp in series with primary circuit at coil to accurately determine when contacts open. The lamp will go out at the instant the contacts separate. After synchronizing contacts, check contact opening. If it is not within limits of .018-.024 inch, reset at .022 inch and repeat synchronization.

**Timing Distributor to Engine:**—Remove the  $\frac{1}{8}$  inch pipe plug from the cylinder head, above No. 6 piston, and screw a micrometer gauge into the tapped hole. Connect the 6 volt lamp to the distributor primary terminal and the battery terminal of the relay. If the relay is not connected to a battery, connect lamp to one terminal of a battery and ground the other terminal of the battery to the engine. When the points are closed the test lamp will burn, but when they are open the circuit is broken and the lamp will go out. Set the distributor at the full manual advance point. Turn the engine over again till it is coming up on the compression stroke on piston No. 1 and stop with the piston .067 inch before top dead center on standard head engines with a ratio of 5.1 to 1 and .004 inch before top dead center on high compression head engines with a ratio of 6.2 to 1. While doing this press the distributor rotor back against the direction of rotation so as to remove all back lash in the drive mechanism. Make sure the rotor is opposite the segment connected to spark plug No. 1. Loosen the screw which clamps the distributor timing lever to the distributor and rotate the distributor until No. 1 cam begins to open the breaker points, i.e., until the lamp goes out. Then tighten the screw and reinstall the spark plug wires. To check ignition timing turn over engine two or three



# CHRYSLER

## MODEL "80-L" (1929), SERIAL NOS. CONTINUED

### DELCO-REMY GENERATING, STARTING SYSTEM

### DELCO-REMY IGNITION

times then come up again on No. 1 compression stroke, tapping the crank lightly until lamp goes out. If the dial reads between the limits of .060 inch on a standard head engine or .002 to .005 inch on a high compression head engine the timing is satisfactory. If outside these limits, it should be reset.

**Firing Order:**—The firing order is 1-5-3-6-2-4.

**Spark Plugs:**—Spark plugs are Champion  $\frac{7}{8}$  inch. Gaps are .027-.030 inch.

**VALVE TIMING:**—**INLET VALVES:**—Head diameter, 1  $\frac{15}{16}$  inches; stem diameter,  $\frac{3}{8}$  inch; stem length, 6  $\frac{3}{16}$  inches. Tappet clearance is .006 inch (hot). Spring pressure is 94 pounds with valves open and 57 pounds with valves closed. The valve lift is  $\frac{5}{16}$  inch. The inlet valves open at 6 degrees after top dead center and close at 46 degrees after lower dead center. **EXHAUST VALVES:**—Head diameter, 1  $\frac{13}{16}$  inches; stem diameter,  $\frac{3}{8}$  inch; stem length, 6  $\frac{3}{16}$  inches. Tappet clearance is .008 inch (hot). Spring pressure is 94 pounds with valves open and 57 pounds with valves closed. The valve lift is  $\frac{5}{16}$  inch. The exhaust valves open at 42 degrees before lower dead center and close 8 degrees after top dead center. Valve stem guides are removable. Oversize valve stems are not made.

**STARTER:**—Model 728-A. Starter is connected to the engine through a back gear Bendix drive. The direction of rotation of the armature shaft is clockwise, looking at the commutator end. Starter cranks the engine at 110 R.P.M. drawing 130 amperes at 5.2 volts. Brush spring tension is 24-28 ounces. Starter switch is Model 404-T.

Torque		Starter Data		
		R.P.M.	Volts	Amperes
0	lb. ft.	Free	5.7	65
1	"	1520	5.5	100
4	"	760	5	200
10	"	460	4.5	300
15.5	"	260	4	400
19.5	"	120	3.5	500
26	"	Lock	3	600

**Mounting:**—Starter is sleeve mounted at left of engine on forward side of flywheel housing. To remove starter, disconnect cable and shift lever and remove large pilot mounting screw from housing directly above starter sleeve. Then pull starter forward and lift from place.

**Oiling:**—Put 4 or 5 drops of light oil in the starter bearing oiler every 1000 miles.

**GENERATOR:**—Model 949-Q. The direction of rotation is counter-clockwise, looking at the commutator end. Generator current regulation is by third

brush shunt field and thermostat. Thermostat contacts open at 165 degrees F. cutting the resistance across the thermostat contacts into the field circuit and reducing the output approximately 40%. To adjust generator output, loosen the small round headed screw on the generator end plate and remove the commutator cover band. Then shift the third brush in a counter-clockwise direction to increase the charging rate and in the opposite direction to decrease the charging rate. Tighten the screw after making the adjustment. With standard car setting the maximum charging rate is 19 amperes (cold) reached at 1600 R.P.M. or 27 miles per hour.

#### Generator Data

Cold Test			Hot Test		
Amperes	Volts	R.P.M.	Amperes	Volts	R.P.M.
0	6.4	575	0	6.4	700
4	6.8	675	5	6.9	1000
10	7.4	850	10	7.4	1500
16	8.1	1150	12	7.7	2000
19	8.4	1600	10	7.6	2600
10	7.5	3250			

Motoring, generator draws 5 amperes at 6 volts. Shunt field current is 4 amperes at 6 volts. Brush spring tension is 24-28 ounces.

**Mounting:**—Generator is flange mounted at right of engine on rear of timing chain case by standard S.A.E. No. 4 flange mounting. To remove generator, disconnect lead and remove 3 flange mounting cap screws. Then pull generator to the rear being careful not to disturb intermediate flange carrying sprocket and timing chain. Then lift generator from place.

**Oiling:**—Put 4 or 5 drops of light oil in the generator oilers every 1000 miles.

**RELAY:**—Model 265-B. Relay is mounted on the generator. Relay contacts close at 600 R.P.M. when the generator voltage reaches 7-7.5 volts and open with a discharge current of 0-2.5 amperes. Charging current at closing of contacts is approximately 2 amperes. Contacts separate .015-.025 inch. Air gap is .014-.021 inch with contacts closed.

**LIGHTING:**—Clum Switch Model 10738. Lighting switch is mounted at the base of the steering column. Head lights are 6-8 volt, 21-21 cp. (double filament-double contact). Mazda No. 1110. Side and dash lights are 6-8 volt, 3 cp. D.C. Mazda No. 64. Tail, stop, dome and corner lights are 6-8 volt, 15 cp. S.C. Mazda No. 87. Backing light is 6-8 volt, 21 cp. S.C. Mazda No. 1129.

**CIRCUIT BREAKER:**—Model 410-B. Lighting circuits are protected by a circuit breaker mounted on the dash. Circuit breaker begins to operate with a current of 25-30 amperes limiting the current to 15 amperes.



# DE SOTO

## MODEL K (1929), SERIAL NOS. KW000P DELCO-REMY GENERATING, STARTING SYSTEM DELCO-REMY IGNITION

**BATTERY:**—Willard, Type WR-13. 6 volt. The positive (+) terminal is grounded. Starting capacity (20 minute rate) is 98 amperes for 20 minutes. Lighting capacity (5 ampere rate) is 5 amperes for 16.8 hours. Battery is mounted under front floor boards on left frame member.

**IGNITION:**—Coil Model 525-E. Distributor Model 631-C. Breaker contacts separate .018-.024 inch with breaker arm on lobe of cam. Resurface contacts on a medium hard oilstone or with a fine flat contact file. To adjust contact opening, loosen lock screw and turn eccentric adjusting screw until desired breaker gap is obtained. Tighten the lock screw to hold adjustment. Distributor is semi-automatic type. Manual advance is 25 degrees (engine). Automatic advance begins at 400 R.P.M. of engine. Maximum automatic advance is 20 degrees at 2540 R.P.M. Breaker arm spring tension is 17.5-20.5 ounces. Ignition current is 2 amperes at 6 volts with engine running and 5 amperes at 6 volts with engine stopped.

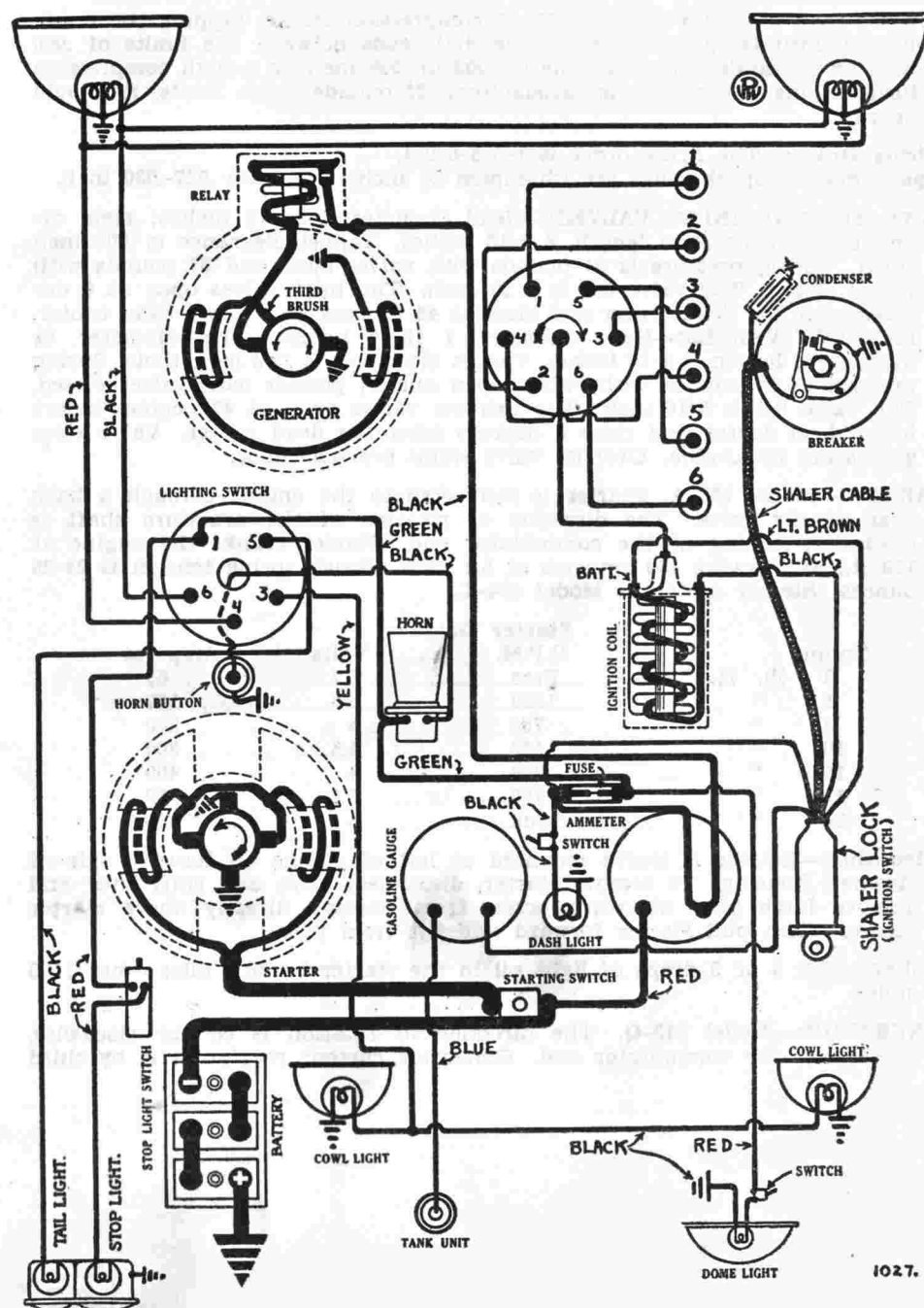
**Mounting:**—Distributor is mounted on a diagonal shaft at the right of the engine and driven by an integrally cut gear on the camshaft. To remove distributor, disconnect manual advance rod and remove advance stop screw. Then lift distributor from place.

**Oiling:**—Fill the grease cup on the side of the distributor with medium cup grease and turn down two turns every month or each 1000 miles.

**Timing:**—To time distributor to the engine remove the  $\frac{1}{8}$  inch pipe plug from the cylinder head (above the No. 6 piston), and screw a micrometer gauge into the tapped hole. Take a small 6 volt test lamp and connect one terminal to the distributor primary terminal and the other side to the battery terminal of the relay. If the relay is not connected to a battery, connect lamp to one terminal of a battery and ground the other terminal of the battery to the engine. When the points are closed the test lamp will burn, but when they are open the circuit is broken and the lamp will go out. Set the distributor at the full manual advance point. Turn the engine over and locate the dead center point, setting the micrometer gauge on zero at the dead center point. Next turn the engine over, coming up on the compression stroke on No. 1 cylinder and stop with the piston .035 inch before top dead center on standard head engines with a ratio of 5.2 to 1 or .008 inch before top dead center on the high compression head engines with a ratio of 6.2 to 1. While doing this press the distributor rotor back against the direction of rotation so as to remove all backlash in the drive mechanism. See that the rotor is at the No. 1 cable terminal. Loosen the screw which clamps the distributor timing lever to the distributor and rotate the distributor counter-clockwise as viewed from above until No. 1 cam begins to open the breaker points, i.e., until the lamp goes out. Tighten the clamp screw and reinstall the spark plug wires. To check timing, turn engine over two or three times then come up again on No. 1 compression stroke, tapping the crank lightly until the lamp goes out. If the dial gauge reads within the following limits ahead of dead center, the timing is satisfactory; if outside these limits, it should be reset. On the standard engines the limits should be within .030-.040 inch and on the high compression .006-.010 inch ahead of dead center.

**Firing Order:**—The firing order is 1-5-3-6-2-4.

**Spark Plugs:**—Spark plugs are Champion Metric 18MM-1.5MM. Gaps are .027-.030 inch.



# DE SOTO

## MODEL K (1929), SERIAL NOS. KWO00P

### DELCO-REMY GENERATING, STARTING SYSTEM DELCO-REMY IGNITION

**VALVE TIMING:—INLET VALVES:—**Head diameter, 1 15/32 inch; stem diameter, 11/32 inch; stem length, 4 11/16 inches. Tappet clearance is .004 inch (hot). Spring pressure is 88 pounds open and 47 pounds closed. Valve lift is 5/16 inch. Intake valves open at 6 degrees after top dead center and close at 46 degrees after lower dead center.

**EXHAUST VALVES:—**Head diameter, 1 15/32 inch; stem diameter, 11/32 inch; stem length is 4 11/16 inches. Tappet clearance is .006 inch (hot). Spring pressure is 88 pounds open and 47 pounds closed. Valve lift is 5/16 inch. Exhaust valves open at 42 degrees before lower dead center and close at 8 degrees after top dead center. Valve stem guides are removable. Over-size valve stems are not made.

**STARTER:—Model 714-J.** Starter is connected to the engine through a Bendix drive. The direction of rotation is counter-clockwise, looking at the commutator end. Brush spring tension is 24-28 ounces.

		Starter Data		
Torque		R.P.M.	Volts	Amperes
0 lb. ft.		4200	5.6	75
3	"	1500	5	200
6	"	800	4.5	300
9.4	"	350	4	400
12.8	"	Lock	3.5	500

**Mounting:—**Starter is flange mounted at left of engine on forward side of bell housing. To remove starter, disconnect starter cable and remove two flange mounting screws. Then slide starter from place.

**Oiling:—**Put 4 or 5 drops of light engine oil in the oiler on the commutator end of the starter every month or each 1000 miles. The bearing on the drive end is oilless.

**GENERATOR:—Model 943-H.** The direction of rotation is counter-clockwise, looking at the commutator end. Generator current regulation is by the third brush system. To adjust the charging rate, loosen the small screw on the generator end plate and shift the third brush mounting plate.

Shifting the third brush in a counter-clockwise direction increases the charging rate and in the opposite direction decreases the charging rate. Tighten the nut after making the adjustment.

#### Generator Data

Cold Test			Hot Test		
Amperes	Volts	R.P.M.	Amperes	Volts	R.P.M.
7.4	7.4	1000	6	7.05	1100
13	7.8	1375	10	7.45	1500
16	8.2	1800	12	7.7	2000
11.8	7.65	2750	10.4	7.5	2500

Shunt field current is 6 amperes at 6 volts. Generator brush tension is 16-18 ounces each.

**Mounting:—**Generator is mounted on the left to the front of the engine and is driven by a belt from the crankshaft. To remove the generator, loosen nut on belt adjustment clamp and swing generator to the side. Remove flange mounting cap screws and lift generator from place.

**Oiling:—**Put 4 or 5 drops of light engine oil in the generator oilers every two weeks or each 500 miles.

**RELAY:—Model 265-B.** Relay is mounted on top of the generator. Relay closes when the generator reaches 600 R.P.M. with a terminal voltage of 7.25 volts and opens at approximately 500 R.P.M. with a discharge current of 0-2.5 amperes. Relay contacts separate .020 inch. Air gap between relay armature and coil core is .016 inch, with contacts closed.

**LIGHTING:—Clum Model 10738.** The lighting switch is mounted at the base of the steering column. Head lights are 6-8 volt, 21-21 cp (double filament-double contact). Mazda No. 1110. Side lights are 6-8 volt, 3 cp. D.C. Mazda No. 64. Dash lights are 6-8 volt, 3 cp. D.C. Mazda No. 64. Tail lights are 6-8 volt, 21-2 cp. D.C. Mazda No. 1158. Dome light is 6-8 volt, 15 cp. S.C. Mazda No. 87.

**FUSES:—**A 20 ampere fuse is mounted on the rear of the dash.



# DODGE

## SENIOR SIX (1929)

### SERIAL NUMBERS S-50001 UP

### NORTH EAST GENERATING, STARTING SYSTEM

### NORTH EAST IGNITION

**BATTERY:**—Willard, Type CWR-17, 6 volt. The positive (+) terminal is grounded. Starting capacity (20 minute rate) is 130 amperes for 20 minutes. Lighting capacity (5 ampere rate) is 5 amperes for 23 hours. The battery is mounted under the front seat.

**IGNITION:**—Coil Type 19232. Ignition current is 2 9/10 amperes at 6 volts with engine running and 5.5 amperes at 6 volts with engine stopped. The ignition coil is mounted on the rear of the dash.

**Distributor Model TBU, Type 10846-AB.** Breaker contacts separate .020 inch with breaker arm on lobe of cam. Resurface contacts with a fine flat contact file or on a medium hard oilstone. To set contact gap, loosen the lock nut on stationary contact stud and turn up stud until proper contact is secured. Breaker arm spring tension is 16 ounces. Breaker has two sets of contacts which must be synchronized to open at the same instant. See Timing. Distributor is semi-automatic. Manual advance is 20 degrees. Automatic advance begins at 400-700 R.P.M. Maximum automatic advance is 15 degrees reached at 2200 R.P.M.

**Mounting:**—Distributor is mounted on cylinder head between cylinders 3 and 4. To remove distributor, disconnect manual advance rod and primary lead. Remove distributor head with high tension cables intact. Remove set screw in side of distributor mounting and lift unit up and out.

**Oiling:**—Put a few drops of medium oil in the oiler on the side of the distributor housing. Remove rotor button and oil the felt wick in the center of the shaft. Put a small bit of vaseline on the face of the breaker cam under the fiber bumpers of the contact arms.

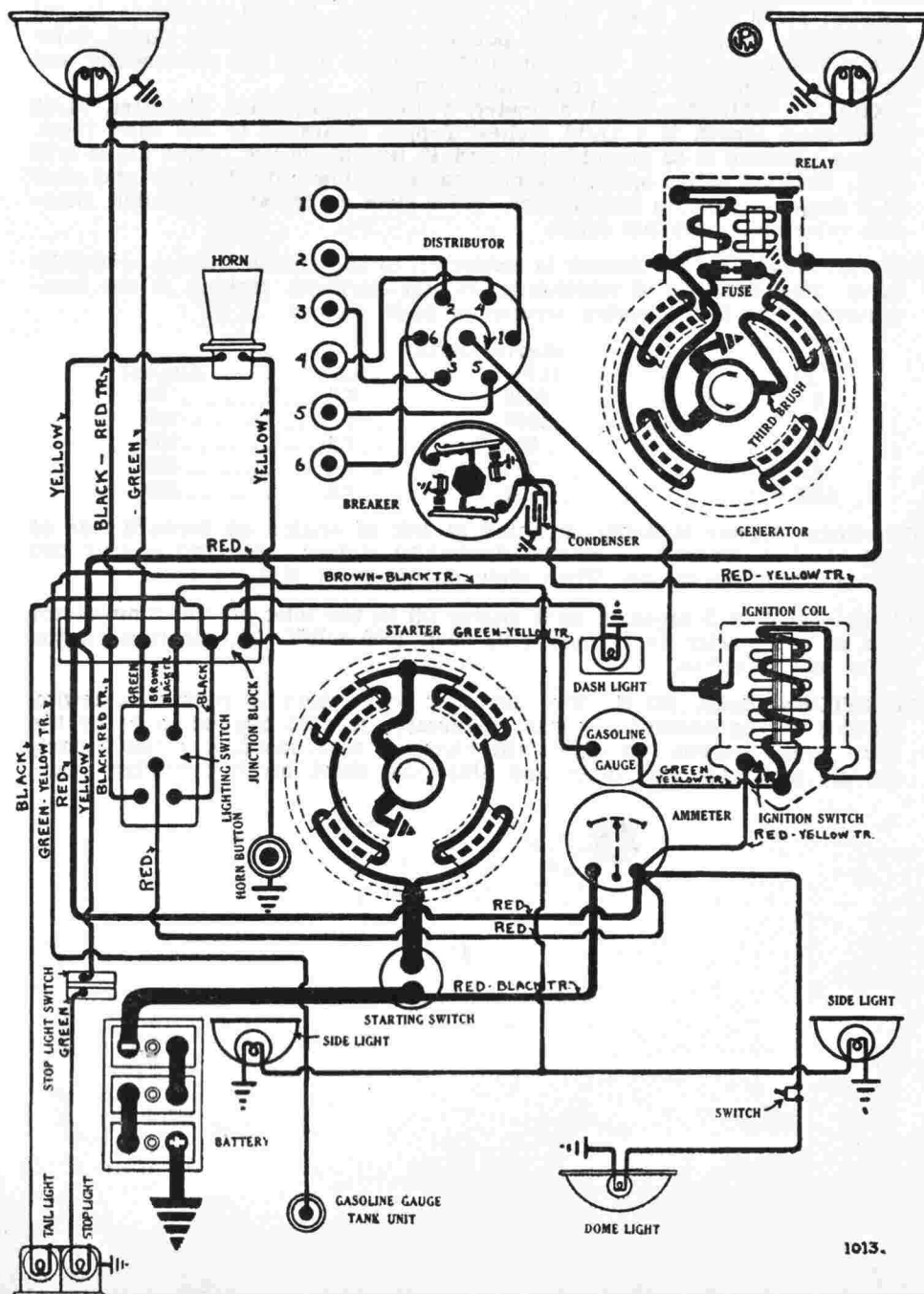
**Timing:**—**Synchronization of Contacts:**—To synchronize contacts, connect a six volt lamp across each of the contacts and watch lamps as contacts open. They should light at the same instant. If they do not, loosen the 2 lock-screws on the breaker plate and shift plate until contacts separate simultaneously. Tighten the screws. Check contact gaps and set at .020 inch.

**Timing Distributor to Engine:**—Breaker contacts separate when piston entering power stroke reaches a position 10 degrees before top dead center with the manual spark control lever in the fully advanced position. To check timing, crank engine over until piston No. 1 is coming up on the compression stroke. This is the up stroke with both valves closed. Continue to crank engine until piston reaches a position 10 degrees before top dead center (measured on the flywheel) when the ignition mark 'IGN' will be in the center of the peephole in the flywheel housing. Contacts should separate at this point. If they do not, loosen the advance arm clamp screw and rotate the distributor until contacts separate. Tighten the clamp screw. With correct setting, the backlash of the gears should be sufficient to open and close contacts. If the ignition switch is turned on the ammeter will swing from '0' to 'Discharge' as the gears are rocked.

**Firing Order:**—The firing order is 1-5-3-6-2-4.

**Spark Plugs:**—Spark plugs are 7/8 inch Champion. Gaps are .025 inch.

**VALVE TIMING:**—**INLET VALVES:**—Head diameter is 1 21/32 inches; stem diameter is 3/8 inch; stem length is 5 11/16 inches. Tappet clearance is .004 inch (hot). Spring pressure is 110 pounds (max.). Valve lift is .320 inch. Inlet valves open at top dead center and close at 48 degrees after lower dead center.





# DODGE

## SENIOR SIX (1929)

### SERIAL NUMBERS S-50001 UP

### NORTH EAST GENERATING, STARTING SYSTEM

### NORTH EAST IGNITION

**EXHAUST VALVES:**—Head diameter is 1 19/32 inches; stem diameter is 3/8 inch; stem length is 5 11/16 inches. Tappet clearance is .006 inch (hot). Spring pressure is 110 pounds (max.). Valve lift is .320 inch. Exhaust valves open at 50 degrees before lower dead center and close at 6 degrees after top dead center. Valve stem guides are removable. Oversize valves are not made.

**STARTER:**—Model SBH, Type 6400. Starter is connected to the engine through an outboard Bendix drive. The direction of rotation is counter-clockwise, looking at the commutator end. Starter cranks the engine at 100 R.P.M. drawing 100 amperes at 4.95 volts. Starter brush spring tension is 3 pounds. Starter switch is Model 15380.

#### Starter Data

Torque	R.P.M.	Volts	Amperes
0 lb. ft.	1700	5.6	120
2.4 "	1500	5.5	140
3.9 "	1200	5.25	180
5.75 "	900	4.9	245
8.25 "	600	4.5	320
11.9 "	300	4.0	425
16. "	Lock	3.1	550

**Mounting:**—Starter is flange mounted by standard S.A.E. No. 1 flange at left of engine on forward side of flywheel housing. To remove starter, disconnect starter cable and remove three flange mounting cap screws. Then slide starter forward and lift from place.

**Oiling:**—Starter bearings are oilless. They require no attention.

**GENERATOR:**—Model LB, Type 6390-A. The direction of rotation is counter-clockwise, looking at the commutator end. Generator current regulation is by third brush shunt field. To adjust charging rate, turn the slotted adjusting pinion extending through the generator end plate. The three brushes are mounted on a plate and the pinion moves all three when the adjustment is made. Turn the pinion in a clockwise direction to increase the charging rate and in the opposite direction to decrease the charging rate. With standard car setting, the charging rate is 14 amperes (hot) reached at 1400 R.P.M. or 25-30 miles per hour.

#### Generator Data

Cold Test		Hot Test	
Amperes	R.P.M.	Amperes	R.P.M.
8	800	6	800
14.5	1000	10.5	1000
17.5	1200	13.25	1200
17.5	1400	13.75	1400
16.75	1600	13.5	1600
15.5	1800	13	1800
14.5	2000	12	2000
12	2400	10.5	2400

Brush spring tension is 12-16 ounces. In service the generator field draws 2.15 amperes at 5.1 volts. The four field coils connected in series directly across a battery draw 8 amperes at 6 volts. Generator motoring, draws 5 amperes at 6 volts.

**Mounting:**—Generator is flange mounted on the right of the engine at the rear of the timing chain case. To remove generator, disconnect lead and remove three flange mounting cap screws. Then pull generator straight to the rear.

**Adjustment of Timing Chain:**—Timing chain is adjusted by shifting the generator around the lower flange mounting screw as a pivot. To adjust chain, loosen cap screws and shift the generator away from the engine until chain operates noiselessly, and tighten the screws. The chain should be loose enough to run without noise.

**Oiling:**—Put a few drops of medium machine oil in each of the generator oilers every 2000 miles.

**RELAY:**—Type 20220. Relay is mounted on top of the generator. Contacts close at 600 R.P.M. when generator voltage reaches 6.75 volts, and open when the generator voltage drops to 5.75-6.0 volts with a discharge current of 1-2 amperes. Relay contacts separate .020-.025 inch. Air gap is .015 inch with contacts closed.

**LIGHTING:**—Briggs and Stratton Switch, Model 40315. Lighting switch is mounted at the base of the steering column. Head lights are 6-8 volt, 21-21 cp. (double filament-double contact) Mazda 1110. Side, dash and tail lights are 6-8 volt, 3 cp. S.C. Mazda 63. Dome light is 6-8 volt, 6 cp. S.C. Mazda 81. Stop light is 6-8 volt, 15 cp. S.C. Mazda 87.

**FUSES:**—Generator field fuse is 6 amperes. Mounted on end of generator.

# ERSKINE

## MODEL 52

### PRODUCTION STARTED AUGUST, 1928

### DELCO-REMY GENERATING, STARTING SYSTEM

### DELCO-REMY IGNITION

**BATTERY:**—Willard, Type CWR-13. 6 volt, 13 plates. The positive (+) terminal is grounded. Starting capacity (20 minute rate) is 98 amperes for 20 minutes. Lighting capacity (5 ampere rate) is 5 amperes for 17 hours. Battery is mounted under front floor boards on right frame member.

**IGNITION:**—Coil Model 525-A. Coil is mounted on the generator. Ignition current is  $\frac{1}{2}$ -2 amperes at 6 volts with engine running and  $4\frac{1}{2}$  amperes at 6 volts with engine stopped.

**Distributor Model 639-R.** Breaker contacts separate .020 inch. Adjust contact opening by loosening locknut directly back of stationary contact and turning eccentric adjusting screw to secure proper setting. The stationary contact is mounted on a movable plate and moves so that contact surfaces are always parallel. Resurface contacts with a fine flat contact file or on a medium hard oilstone. Breaker arm spring tension is 18-21 ounces. Distributor is semi-automatic. Maximum manual advance is 15 degrees (engine). Automatic advance starts at 500 R.P.M. of engine. Maximum automatic advance is 24 degrees reached at 1700 R.P.M.

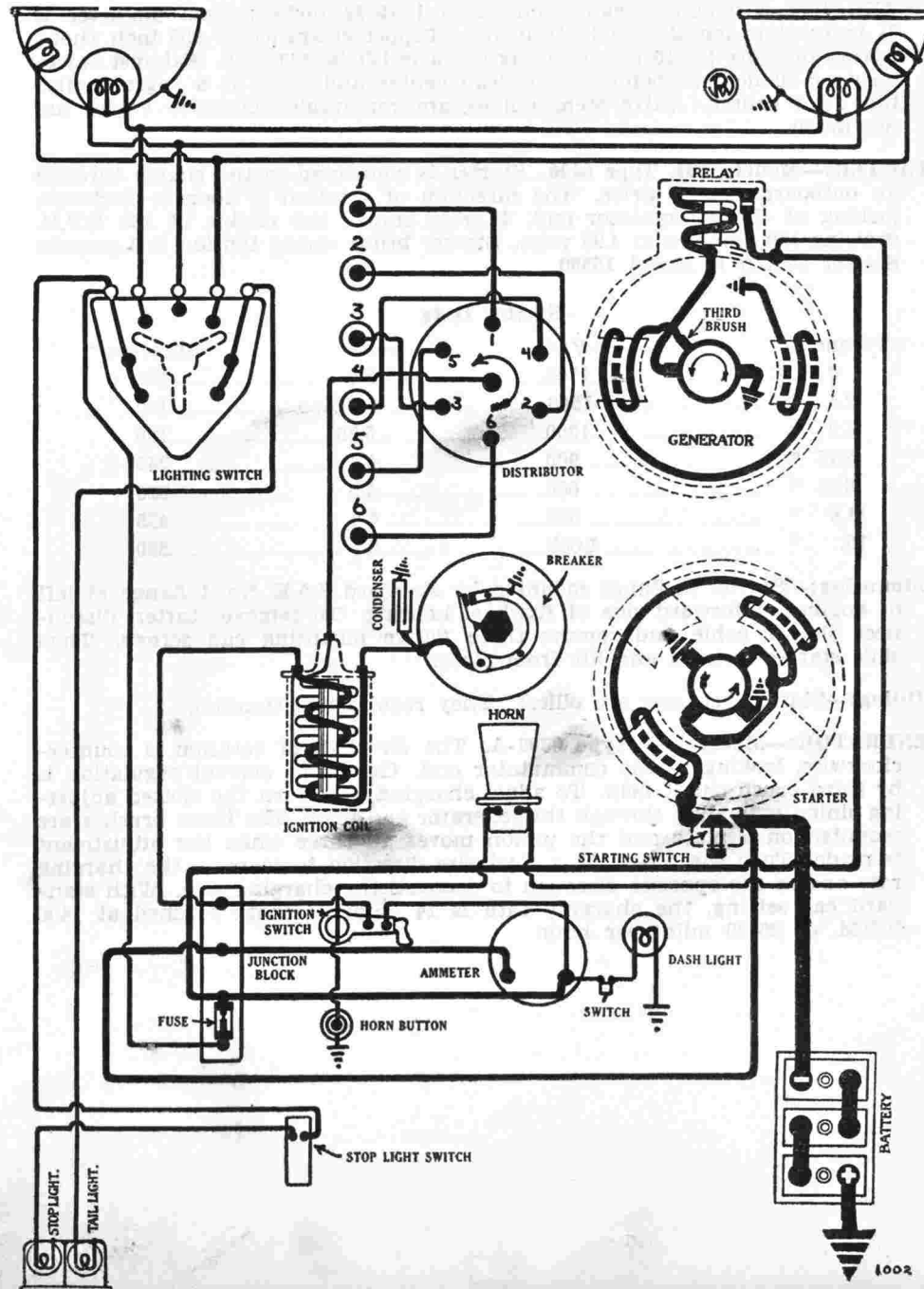
**Mounting:**—Distributor is mounted on the rear of the generator at the right of the engine. To remove distributor, disconnect manual advance rod and primary lead and remove head with high tension cables intact. Then loosen the clamp screw in the distributor shaft housing and lift the distributor from place.

**Oiling:**—Fill the grease cup on the side of the shaft with medium cup grease and turn down two turns every 2500 miles or once a month. At the same time remove the distributor head and rotor and put 4 or 5 drops of light oil in the wick oiler in the center of the distributor shaft.

**Timing:**—Breaker contacts begin to separate when the piston entering power stroke reaches a position  $7\frac{1}{2}$  degrees after top dead center measured on the flywheel with manual spark lever fully retarded. To set timing, crank engine until piston No. 1 enters compression stroke (the upstroke with both valves closed). Continue to crank engine until piston reaches top dead center. Determine flywheel mark "T-DC-1-6" through timing hole in left rear engine support. Piston No. 6 and No. 1 reach top dead center at the same instant. Then advance spark lever exactly one half. Breaker contacts should begin to separate at this point. If they do not, loosen clamp screw in advance arm and rotate distributor until contacts separate. Tighten the clamp screw. Ignition timing can also be set on full retard by cranking engine over  $7\frac{1}{2}$  degrees after top dead center when the flywheel mark "SP-RE-1-6" will be opposite the indicator. Contacts should separate at this point with the spark lever fully retarded. Connect the segment directly opposite rotor to spark plug in cylinder No. 1 and connect remaining plugs in order 5-3-6-2-4 counter-clockwise around the distributor head.

**VALVE TIMING:**—INLET VALVES:—Head diameter,  $1\frac{21}{64}$  inches; stem diameter  $\frac{5}{16}$  inch; stem length,  $4\frac{7}{8}$  inches. Tappet clearance, .005 inch (cold). Spring pressure, 67 to 73 pounds (valve open). Valve lift is  $\frac{5}{16}$  inch. Intake opens 5 degrees past top dead center and closes 54 degrees past lower dead center.

**EXHAUST VALVES:**—Head diameter,  $1\frac{19}{64}$  inches; stem diameter  $\frac{5}{16}$  inch; stem length,  $4\frac{7}{8}$  inches. Tappet clearance, .003 inch (cold). Spring pressure is 67 to 73 pounds (valve open). Valve lift,  $\frac{5}{16}$  inch. Exhaust opens 40 degrees before lower dead center and closes 12 degrees past top dead



# ERSKINE

MODEL 52

## PRODUCTION STARTED AUGUST, 1928 DELCO-REMY GENERATING, STARTING SYSTEM DELCO-REMY IGNITION

center. Exhaust closing of cylinder No. 1 is marked on the flywheel by mark "EX-CL-1-6". Valve stem guides are removable. Oversize valve stems are not made.

**STARTER:—Model 712-H.** Starter is connected to the engine through an out-board Bendix drive. The direction of rotation is counter-clockwise, looking at the commutator end. Starter cranks engine at 110 R.P.M. drawing 225 amperes at 4.8 volts. Brush spring tension is 24-28 ounces.

Starter Data			
Torque	R.P.M.	Volts	Amperes
0 lb. ft.	4500	5	70
4 "	1100	4.8	225
11 "	Lock	3.75	450

**Mounting:—**Starter is flange mounted at right of engine on forward side of flywheel housing. To remove starter, disconnect cable and remove one bolt and two flange mounting cap screws. Then pull starter forward and lift from place.

**Oiling:—**Put 8 or 10 drops of light oil in the oiler on the commutator end of the starter every 2500 miles or once a month. The drive end is oilless.

**GENERATOR:—Model 940-C.** The direction of rotation is counter-clockwise, looking at the commutator end. Generator current regulation is by third brush shunt field. To adjust generator output, loosen small round headed screw on generator end plate and remove commutator cover band. Then shift third brush in a counter-clockwise direction to increase the charging rate and in the opposite direction to decrease the charging rate. Tighten the screw after making the adjustment. With standard car setting, maximum charging rate is 12 amperes at 7.6 volts reached at 1700 R.P.M.

Generator Data		
Hot Test		
Amperes	Volts	R.P.M.
0	6.4	690
7	7.1	1080
10	7.4	1340
12	7.6	1700
10	7.4	2600

Motoring, generator draws 5 amperes at 6 volts. Shunt field current is 4.3 amperes at 6 volts. Brush spring tension is 18 ounces.

**Mounting:—**Generator is flange mounted at right of engine on rear of timing chain case. To remove generator, disconnect all ignition wiring or remove distributor and coil. Then back off chain adjustment screw and remove two flange mounting cap screws. Pull generator to rear, being careful not to disturb timing chain mesh on sprockets.

**Adjustment of Timing Chain Tension:—**Timing chain tension is adjusted by shifting generator around lower flange mounting cap screw as a pivot. To adjust chain, loosen both flange mounting cap screws and turn up on adjusting screw until chain begins to hum with engine running. Then back off adjusting screw until chain runs noiselessly and tighten flange cap screws. Be careful not to get the chain too tight. With proper tension the chain will run without noise.

**Oiling:—**Put 8 or 10 drops of light oil in the oiler on the commutator end of the generator every 2500 miles or once a month. The drive end bearing is oiled by splash from the chain case.

**RELAY:—Model 265-B.** Relay is mounted on the generator. Relay closes at 12 M.P.H. when the generator voltage reaches 6.8 volts at 800 R.P.M. and opens at 9 M.P.H. with a discharge current of 1 ampere. Contacts separate at .014 inch. Air gap is .014 inch with contacts closed. Charging current at closing of contacts is approximately 2 amperes.

**LIGHTING:—Delco-Remy Switch Model 484-E.** Switch is mounted on lower end of steering column. Head lights are 6-8 volt, 21-21 cp. (double filament-double contact base). Mazda No. 1110. Side, dash and tail lights are 6-8 volt, 3 cp. S.C. Mazda No. 63. Dome light is 6-8 volt, 6 cp. S.C. Mazda No. 81. Stop light is 6-8 volt, 15 cp. S.C. Mazda No. 87.

**FUSES:—**Lighting fuse on front of dash is 20 amperes capacity.



# FRANKLIN

## SERIES 12 "AIRMAN LIMITED"

PRODUCTION STARTED JULY, 1928  
OWEN-DYNETO GENERATING, STARTING SYSTEM  
NORTH EAST IGNITION

**BATTERY:**—Westinghouse, Type 6-PRB-19. 6 volt. 19 plates. The negative (—) terminal is grounded. Starting capacity (20 minute rate) is 148 amperes for 20 minutes. Lighting capacity (5 ampere rate) is 5 amperes for 29 hours. Battery is mounted under the right front seat.

**IGNITION:**—Coil Model TU. Coil is mounted on the right side of the engine on the distributor bearing cap. Ignition current is 2 amperes at 6.8 volts with engine running and 4.5 amperes at 6.4 volts with engine stopped.

**Distributor Model TBU.** Breaker contacts separate .020 inch with breaker arm on lobe of cam. Adjust contact gap by loosening lock screw on stationary contact stud and turning up stud until proper gap is secured. Condenser is mounted on side of distributor. Distributor is semi-automatic. Manual advance is 16 degrees (engine). Automatic advance begins at 400 R.P.M. of engine. Maximum automatic advance is 37 degrees reached at 2175 R.P.M.

**Mounting:**—Distributor is mounted on the right side of crankcase. To remove distributor, remove the cap screws holding distributor mounting casting to crankcase.

**Oiling:**—Put 4 or 5 drops of light oil in the oiler on side of distributor housing every 1000 miles. Every 2000 miles remove distributor head and rotor and put a few drops of oil in the wick oiler in the center of the shaft.

**Timing:**—Breaker contacts begin to separate when the piston entering power stroke reaches a position  $1\frac{1}{8}$  inch before top dead center with the spark control button all the way in, in the fully advanced position. To set timing, remove engine air housing cover. Set breaker points to .020 inch. Crank engine over slowly until piston No. 1 is near upper dead center and the triangle mark on the front of the fan rim is  $1\frac{1}{8}$  inch before dead center, which is marked by a vertical line on the front inside section of the fan housing. Push the spark control button on the instrument panel all the way in (the fully advanced position). Disconnect the wire to spark plug No. 1 and turn on ignition. Loosen clamp screw on the spark control lever and rotate distributor until spark is seen at spark plug No. 1 with the disconnected wire held near plug. With correct setting the backlash of the gears should be sufficient to open and close the contacts. Rock the distributor shaft back and forth and watch dash ammeter. It should swing between "O" and "Discharge."

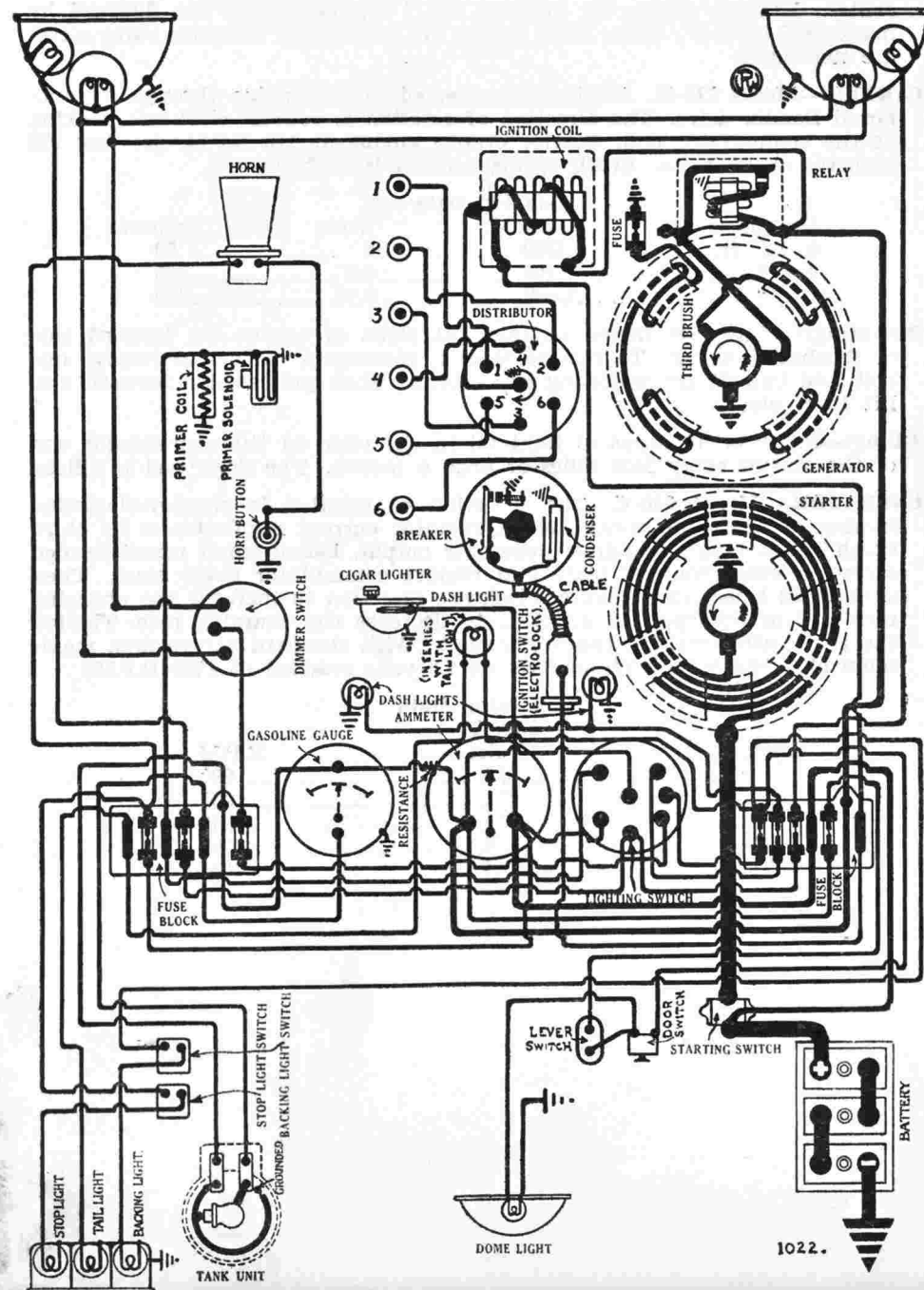
**Firing Order:**—The firing order is 1-4-2-6-3-5.

**Spark Plugs:**—Spark plugs are special Champion "Franklin" (Metric). Gaps are .025 inch.

**VALVE TIMING:**—INLET VALVES:—Head diameter is  $1\frac{9}{16}$  inches; stem diameter is .338 inch; stem length is  $4\frac{27}{32}$  inches. Tappet clearance is .010 inch (cold). Spring pressure is 32-34 pounds. Valve lift is  $\frac{5}{16}$  inch. Inlet valves open at top dead center and close at 57 degrees after lower dead center.

**EXHAUST VALVES:**—Head diameter is  $1\frac{1}{2}$  inches; stem diameter is .338 inch; stem length is  $4\frac{23}{32}$  inches. Tappet clearance is .010 inch (cold). Spring pressure is 32-34 pounds. Valve lift is  $\frac{5}{16}$  inch. Exhaust valves open at  $43\frac{1}{2}$  degrees after lower dead center and close at 25 degrees after top dead center. Valve stem guides are removable. Oversize valve stems are not made.

**STARTER:**—Model DH-696. Starter is connected to the engine through a Bendix drive. The direction of rotation is counter-clockwise, looking at the commutator end. Starter cranks the engine at 125 R.P.M., drawing 160 amperes at 5.2 volts. Brush spring tension is 2-2.5 pounds.



# FRANKLIN

## SERIES 12 "AIRMAN LIMITED"

### PRODUCTION STARTED JULY, 1928

### OWEN-DYNETO GENERATING, STARTING SYSTEM

### NORTH EAST IGNITION

Torque		Starter Data		
		R.P.M.	Volts	Amperes
1	lb. ft.	1500	5.4	120
1.8	"	1200	5.6	150
4	"	800	5.5	210
10	"	400	4.3	360
24	"	Lock	3.4	625

**Mounting:**—Starter is flange mounted at right of engine on forward side of flywheel case. To remove starter, disconnect cable and remove 3 flange mounting cap screws. Pull starter forward and lift from place.

**Oiling:**—Starter bearings are oilless. They require no attention.

**GENERATOR:**—Model CD-814. Generator is a four pole straight shunt field generator with third brush control. The direction of rotation is counter-clockwise, looking at the commutator end. Generator current regulation is by third brush shunt field. To adjust generator output, turn slotted screw on generator frame to shift third brush. Turn the screw in a clockwise direction to increase the charging rate and in the opposite direction to decrease the charging rate. With standard car setting, the maximum charging rate is 14-16 amperes at 7.8-8 volts reached at 1400 R.P.M. or 21.8 M.P.H.

Generator Data		
Amperes	Volts	R.P.M.
0	6.25	540
9	7.25	800
16	8.0	1400
13.4	7.7	2400
10.4	7.4	3200

Stalled generator draws 25 amperes at 6.3 volts. Shunt field current is 3.6 amperes (hot) at 5 volts. Brush spring tension is (main brushes) 1-1.5

pounds, (third brush) 1-1.25 pounds. A five ampere field fuse is located on the commutator end plate of the generator. The generator drive end bearing is located in the engine.

**Mounting:**—Generator is mounted at right of engine on rear of timing chain case. To remove generator, disconnect lead and remove 3 flange mounting cap screws. Pry generator to the rear being careful not to disturb plate between generator and chain case which carries generator bearing and drive sprocket. If this is removed the timing of the valves will be disturbed. The generator must not be run on the test stand without bolting a special bearing on the drive end. This can be secured from the Owen-Dyneto Corporation.

**Oiling:**—Put 4 or 5 drops of light oil in the oiler on the commutator end of the generator every month or each 1000 miles. The drive end is oiled by splash from the chain case.

**RELAY:**—Relay is mounted on the generator. Relay contacts close at 8 M.P.H. or 540 R.P.M. when the generator voltage reaches 6.25 volts and open at 7 M.P.H. or 490 R.P.M. with a discharge current of 1 ampere. Relay contacts separate .032 inch. Air gap is 1/32 inch with contacts closed.

**LIGHTING:**—Soreng Manegold Switch. The lighting switch is mounted on the instrument panel. Head lights are 6-8 volts, 21-21 cp. (double filament-double contact) Mazda No. 1110. Dimmer lights are 6-8 volt, 6 cp. S.C. Mazda No. 81. Dash, dome and corner lights are 6-8 volt, 3 cp. S.C. Mazda No. 63. Tail light is 3-4 volt, 2 cp. S.C. Mazda No. 61. Stop and backing lights are 6-8 volt, 21 cp. S.C. Mazda No. 1129. Tail light is in series with one dash light which is also 3-4 volt, 2 cp.

**FUSES:**—Lighting fuses are mounted on block on dash. They are 20 ampere capacity.

# GARDNER

## MODELS 120 AND 125 (1929)

### DELCO-REMY GENERATING, STARTING SYSTEM DELCO-REMY IGNITION

**BATTERY:**—Prest-O-Lite, Type 615-JFK, 6 volt, 15 plates. The positive (+) terminal is grounded. Starting capacity (20 minute rate) is 120 amperes for 20 minutes. Lighting capacity (5 ampere rate) is 5 amperes for 20 hours. Battery is mounted on frame under right front floor boards.

**IGNITION:**—Coil Model 528-Y. Ignition current is .6-2.5 amperes at 6 volts with engine running and 4.5 amperes at 6 volts with engine stopped. Coil is mounted on the back of the instrument board with the switch extending through to the driving compartment.

**Distributor Model 658-B.** Breaker contacts separate .022 inch with breaker arm on lobe of cam. Set contact gap by loosening lock screw on stationary contact plate and turning eccentric adjusting screw until proper setting is secured. Resurface contacts with a fine flat contact file or on a medium hard oilstone. Breaker arm spring tension is 17-21 ounces. Breaker uses two sets of contacts in a single four sided cam. Contacts open alternately at intervals of 45 degrees corresponding to 90 degrees of crankshaft rotation. This is the correct firing interval for the Gardner engine and breaker must be accurately set. See Timing. Distributor is semi-automatic. Maximum manual advance is 15 degrees (engine). Automatic advance begins at 500 R.P.M. and reaches a maximum of 17.5 degrees (engine) at 2000 R.P.M.

**Mounting:**—Distributor is mounted in well on top of cylinder head. To remove distributor, disconnect manual advance rod and breaker lead. Remove distributor head with cables in place. Remove manual advance stop screw and lift distributor out.

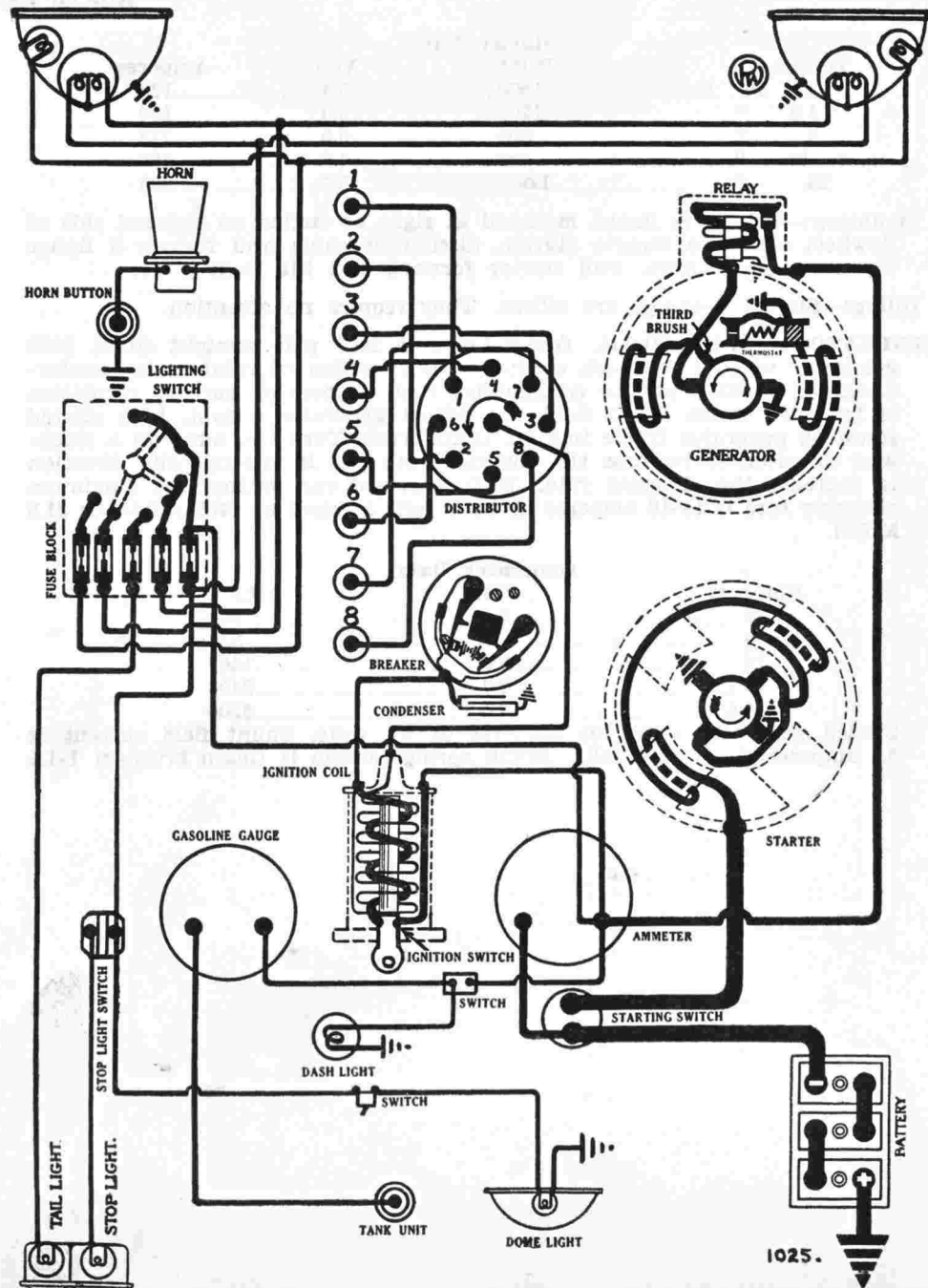
**Oiling:**—Fill the grease cup under the distributor head with medium cup grease and turn down one turn every two weeks or each 500 miles. Every 5000 miles remove the rotor and saturate the wick oiler in the center of the shaft with light engine oil. Place a small bit of vaseline on the face of the breaker cam under the fiber bumper of the contact arm.

**Timing:**—**Synchronization of Contacts:**—Use Delco-Remy Tool, Part No. 820738, and follow special directions given on Page S-31. Contacts can be synchronized without tool after distributor has been timed to engine by cranking engine over 90 degrees from firing position of piston No. 1 when piston No. 6 will reach firing position. The second set of contacts should separate at this point. If they do not, loosen lock screws and turn eccentric adjusting screw on breaker plate until contacts begin to open. Tighten the lock screws and check the contact gap with the breaker arm on the lobe of the cam. If it is not within the limits of .018-.024 inch reset at .022 inch and repeat synchronization operation.

**Timing Distributor to Engine:**—Breaker contacts begin to separate when the piston entering power stroke reaches a position 6 degrees (on the flywheel) before top dead center with the spark lever fully advanced. To set timing, crank engine over until piston No. 1 enters compression stroke. This is the upstroke with both valves closed. Fully advance spark lever. Continue to crank engine until a point approximately 1.6 teeth on flywheel before top dead center mark is opposite the indicator on the flywheel case. Then loosen clamp screw on advance arm and rotate distributor until one set of contacts open. Tighten clamp screw and connect segment opposite rotor to spark plug in cylinder No. 1. Connect remaining plugs in order 6-2-5-8-3-7-4 counter-clockwise around the distributor head.

**Firing Order:**—The firing order is 1-6-2-5-8-3-7-4.

**Spark Plugs:**—Spark plugs are 7/8-18 S.A.E. Standard. Gaps are .030 inch.





# GARDNER

## MODELS 120 AND 125 (1929)

### DELCO-REMY GENERATING, STARTING SYSTEM DELCO-REMY IGNITION

**VALVE TIMING:—INLET VALVES:—**Head diameter, 1 17/32 inches; stem diameter, 11/32 inch; stem length, 5 1/4 inches. Tappet clearance is .008 inch (hot). Spring pressure is 50 pounds (valve closed). Valve lift is 11/32 inch. Inlet valves open at top dead center and close 45 degrees after lower dead center.

**EXHAUST VALVES:—**Head diameter, 1 17/32 inches; stem diameter, 11/32 inch; stem length, 5 1/4 inches. Tappet clearance is .008 inch (hot). Spring pressure is 50 pounds (valve closed). Valve lift is 11/32 inch. Exhaust valves open 50 degrees before lower dead center and close 10 degrees after top dead center. Valve stem guides are removable. Oversize valve stems are made.

**STARTER:—Model 716-A.** Starter is connected to the engine through a Bendix drive. The direction of rotation is counter-clockwise, looking at the commutator end. Starter brush tension should be 24-28 ounces. Starter switch is Model 406-D.

Starter Data			
Torque	R.P.M.	Volts	Amperes
0 lb. ft.	3000	5	70
15 "	Lock	3.7	450

**Mounting:—**Starter is flange mounted at left of engine on the forward side of the flywheel housing. To remove starter, disconnect cable and starting pedal rod. Then remove 3 cap screws on flange. Lift starter forward and out.

**Oiling:—**Put 4 or 5 drops of light engine oil in the oiler on the starter every 1000 miles. The drive end bearing is oilless.

**GENERATOR:—Model 949-C.** The direction of rotation of the generator is counter-clockwise, looking at the commutator end. Current regulation is by the third brush system, combined with a thermostat. The thermostat contacts open at 150 degrees F. To adjust the generator output, loosen the screw on the generator end plate and shift the third brush mounting plate

in a counter-clockwise direction to increase the charging rate and in the opposite direction to decrease the charging rate.

Generator Data			Hot Test		
Cold Test		R.P.M.	Amperes	Volts	R.P.M.
Amperes	Volts				
19-21	8.5	1450	9-12	7.5	2000

Generator motoring draws 5.5 amperes at 6 volts. Shunt field current is 5 amperes at 6 volts. Generator brush spring tension is 24-28 ounces.

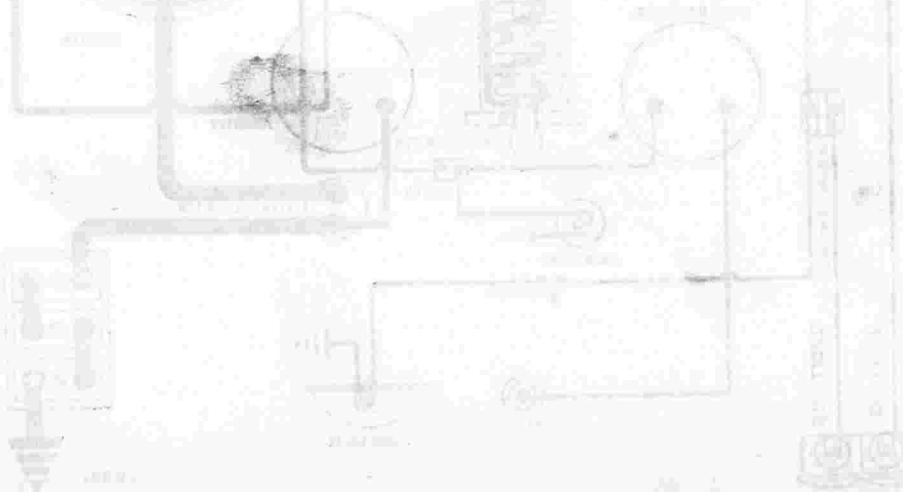
**Mounting:—**Generator is flange mounted at right of engine on rear of timing chain case. To remove generator, loosen mounting bracket screws; push generator and water pump towards crank case, pry off belt. Remove water connections to pump, take out generator mounting screws, lift out generator and pump assembly. Radiator must be drained before the pump can be removed.

**Oiling:—**Put 4 or 5 drops of light engine oil in the generator oiler every 1000 miles.

**RELAY:—Model No. 265-B.** Relay is mounted on the generator. Relay contacts close at 675 R.P.M. of the generator armature or 6-7 miles per hour with a generator voltage of 6.57 volts. Contacts open with a discharge current of 2.5 amperes. Relay contacts separate .015-.025 inch. Air gap between relay armature and coil core is .014-.021 inch with contacts closed.

**LIGHTING:—Delco-Remy Lighting Switch Model 420-Q.** Switch is mounted on the lower end of the steering column. Head lights are 6-8 volt, 21-21 cp. (double filament-double contact base using 21 cp. filament instead of dimming) Mazda No. 1110. Parking lights are 6-8 volt, 3 cp. S.C. Mazda No. 63. Side lights are 6-8 volt, 6 cp. S.C. Mazda No. 81. Dash lights are 6-8 volt, 3 cp. S.C. Mazda No. 63. Tail lights are 6-8 volt, 3 cp. S.C. Mazda No. 63. Stop light is 6-8 volt, 15 cp. S.C. Mazda No. 87. Dome light is 6-8 volt, 3 cp. D.C. Mazda No. 64.

**FUSES:—**There are five 10 ampere fuses mounted on the lighting switch.



# GARDNER

## MODEL 130 (1929)

### DELCO-REMY GENERATING, STARTING SYSTEM DELCO-REMY IGNITION

**BATTERY:**—Prest-O-Lite, Type 617-RHK, 6 volt, 135 ampere hour. The positive (+) terminal is grounded. Starting capacity (20 minute rate) is 152 amperes for 20 minutes. Lighting capacity (5 ampere rate) is 5 amperes for 27 hours. Battery is mounted on frame under right front floor boards.

**IGNITION:**—Coil Model 528-Y. Ignition current is .6-2.5 amperes at 6 volts with engine running and 4.5 amperes at 6 volts with engine stopped. Coil is mounted on the back of the instrument board with the switch extending through to the driving compartment.

**Distributor Model 658-R.** Breaker contacts separate .022 inch with breaker arm on lobe of cam. Set contact gap by loosening lock screw on stationary contact plate and turning eccentric adjusting screw until proper setting is secured. Resurface contacts with a fine flat contact file or on a medium hard oilstone. Breaker arm spring tension is 17-21 ounces. Breaker uses two sets of contacts on a single four sided cam. Contacts open alternately at intervals of 45 degrees corresponding to 90 degrees of crankshaft rotation. This is the correct firing interval for the Gardner engine and breaker must be accurately set. See Timing. Distributor is semi-automatic. Maximum manual advance is 15 degrees (engine). Automatic advance begins at 500 R.P.M. and reaches a maximum of 17.5 degrees (engine) at 2000 R.P.M.

**Mounting:**—Distributor is mounted in well on top of cylinder head. To remove distributor, disconnect manual advance rod and breaker lead. Remove distributor head with cables in place. Remove manual advance stop screw and lift distributor out.

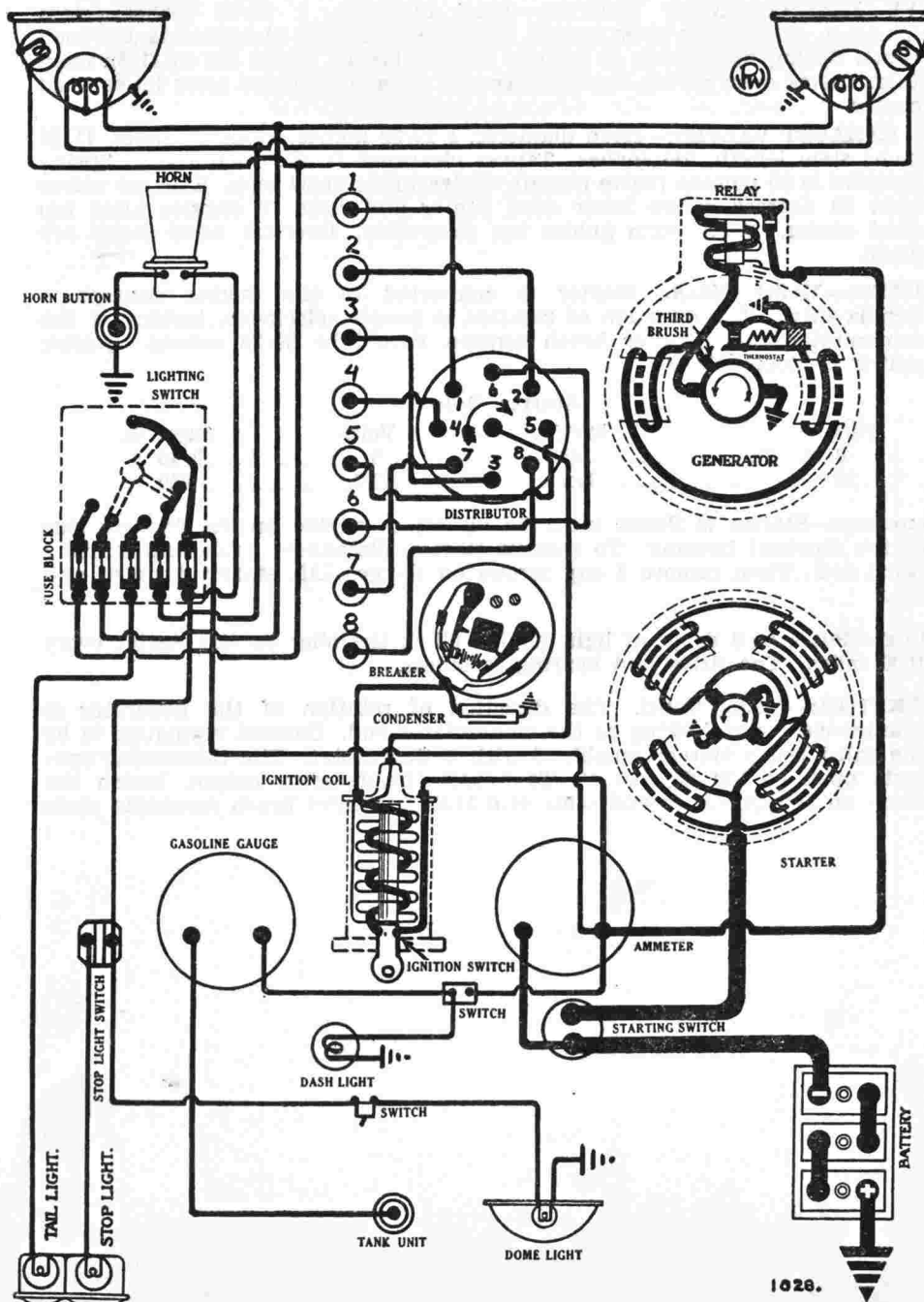
**Oiling:**—Fill the grease cup under the distributor head with medium cup grease and turn down one turn every two weeks or each 500 miles. Every 5000 miles remove the rotor and saturate the wick oiler in the center of the shaft with light engine oil. Place a small bit of vaseline on the face of the breaker cam under the fiber bumper of the contact arm.

**Timing:**—**Synchronization of Contacts:**—Use Delco-Remy Tool, Part No. 820738, and follow special directions given on Page S-31. Contacts can be synchronized without tool after distributor has been timed to engine by cranking engine over 90 degrees from firing position of piston No. 1 when piston No. 6 will reach firing position. The second set of contacts should separate at this point. If they do not, loosen lock screws and turn eccentric adjusting screw on breaker plate until contacts begin to open. Tighten the lock screws and check the contact gap with the breaker arm on the lobe of the cam. If it is not within the limits of .018-.024 inch, reset at .022 inch and repeat synchronizing.

**Timing Distributor to Engine:**—Breaker contacts begin to separate when the piston entering power stroke reaches a position 6 degrees (on the fly-wheel) before top dead center with the spark lever fully advanced. To set timing, crank engine over until piston No. 1 enters compression stroke. This is the upstroke with both valves closed. Fully advance spark lever. Continue to crank engine until a point approximately 2 teeth on the fly-wheel before the top dead center mark is opposite the indicator on the flywheel case. Then loosen clamp screw in advance arm and rotate distributor until one set of contacts open. Tighten clamp screw and connect segment opposite rotor to spark plug in cylinder No. 1. Connect remaining plugs in order 6-2-5-8-3-7-4 clockwise around the distributor head.

**Firing Order:**—The firing order is 1-6-2-5-8-3-7-4.

**Spark Plugs:**—Spark plugs are 7/8-18 S.A.E. Standard. Gaps are .030 inch.



# GARDNER

MODEL 130 (1929)

DELCO-REMY GENERATING, STARTING SYSTEM

DELCO-REMY IGNITION

**VALVE TIMING:**—INLET VALVES:—Head diameter,  $1\frac{5}{8}$  inches; stem diameter,  $11/32$  inch; stem length,  $4\frac{7}{8}$  inches. Tappet clearance is .006 inch (hot). Spring pressure is 36 pounds (valve closed). Valve lift is  $5/16$  inch. Inlet valves open at top dead center and close 45 degrees after lower dead center.

**EXHAUST VALVES:**—Head diameter,  $1\frac{15}{32}$  inches, stem diameter,  $11/32$  inch; stem length,  $4\frac{7}{8}$  inches. Tappet clearance is .008 inch (hot). Spring pressure is 36 pounds (valve closed). Valve lift is  $5/16$  inch. Exhaust valves open at 50 degrees before lower dead center and close 10 degrees after top dead center. Valve stem guides are removable. Oversize valve stems are made.

**STARTER:**—Model 720-Q. Starter is connected to the engine through a Bendix drive. The direction of rotation is counter-clockwise, looking at the commutator end. Starter brush tension should be 24-28 ounces. Starter switch is Model 406-D.

Starter Data			
Torque	R.P.M.	Volts	Amperes
0 lb. ft.	6000	5.0	65
15 " "	Lock	3.15	570

**Mounting:**—Starter is flange mounted at left of engine on the forward side of the flywheel housing. To remove starter, disconnect cable and starting pedal rod. Then remove 3 cap screws on flange. Lift starter forward and out.

**Oiling:**—Put 4 or 5 drops of light engine oil in the oiler on the starter every 1000 miles.

**GENERATOR:**—Model 941-D. The direction of rotation of the generator is counter-clockwise, looking at the commutator end. Current regulation is by the third brush system, combined with a thermostat. The thermostat contacts open at 150 degrees F. To adjust the generator output, loosen the screw on generator end plate and shift the third brush mounting plate in a counter-clockwise direction to increase the charging rate and in the opposite direction to decrease the charging rate.

## Generator Data

Cold Test		R.P.M.	Hot Test		R.P.M.
Amperes	Volts		Amperes	Volts	
19-21	8.5	1450	9-12	7.5	2000

Generator motoring draws 5.5 amperes at 6 volts. Shunt field current is 5 amperes at 6 volts. Generator brush spring tension is 24-28 ounces.

**Mounting:**—Generator is flange mounted at right of engine on rear of timing chain case. To remove generator, take off hose connections at water pump, loosen plate on front of chain case and swing out of the way. Loosen generator flange nuts, push generator towards motor, lift off chain from sprocket; keep chain from dropping down in chain case by fastening up with wire. Take out flange mounting nuts and lift generator and pump assembly from place.

**Oiling:**—Put 4 or 5 drops of light engine oil in the generator oiler every 1000 miles.

**RELAY:**—Model 265-B. Relay is mounted on the generator. Relay contacts close at 675 R.P.M. of the generator armature or 6-7 miles per hour with a generator voltage of 6.57 volts. Contacts open with a discharge current of 2.5 amperes. Relay contacts separate .015-.025 inch. Air gap between relay armature and coil core is .014-.021 inch with contacts closed.

**LIGHTING:**—Delco-Remy Lighting Switch Model 420-Q. Switch is mounted on the lower end of the steering column. Head lights are 6-8 volt, 21-21 cp. (double filament-double contact base using 21 cp. filament instead of dimming) Mazda No. 1110. Parking and tail lights are 6-8 volt, 3 cp. S.C. Mazda No. 63. Side lights are 6-8 volt, 6 cp. S.C. Mazda No. 81. Dash lights are 6-8 volt, 3 cp. S.C. Mazda No. 63. Stop and backing lights are 6-8 volt 15 cp. S.C. Mazda No. 87. Corner lamps are 6-8 volt, 3 cp. D.C. Mazda No. 64.

**FUSES:**—There are five 10 ampere fuses mounted on the lighting switch.



# LA SALLE

SERIES 328, BEGINNING ENGINE NO. 400001  
PRODUCTION STARTED AUGUST, 1928  
DELCO-REMY GENERATING, STARTING SYSTEM  
DELCO-REMY IGNITION

**BATTERY:**—Exide, Type 3-MXV-15-1. 6 volt. Rated capacity 100 ampere hours. Starting capacity 114 amperes for 20 minutes (20 minute rate). Lighting capacity (5 ampere rate) is 5 amperes for 20 hours. The positive (+) terminal is grounded. The battery is mounted under the front seat on the right side.

**IGNITION:**—Coil Model 2195. Distributor Model 4041. Breaker contacts separate .022-.027 inch. They are made of tungsten. Resurface contacts whenever necessary with fine flat contact file or on medium hard oilstone. Distributor is semi-automatic. Maximum manual advance is 38 degrees (engine). Automatic advance begins at approximately 1100 R.P.M. Maximum automatic advance is 21 degrees (engine). Breaker arm spring tension is 16-20 ounces. There are two sets of breaker contacts set at an angle of 135 degrees and operating on a four lobed cam. Contacts open alternately at intervals of 45 degrees, corresponding to 90 degrees of crankshaft rotation. This is the correct firing interval for the La Salle engine and must be accurately set. (See Timing).

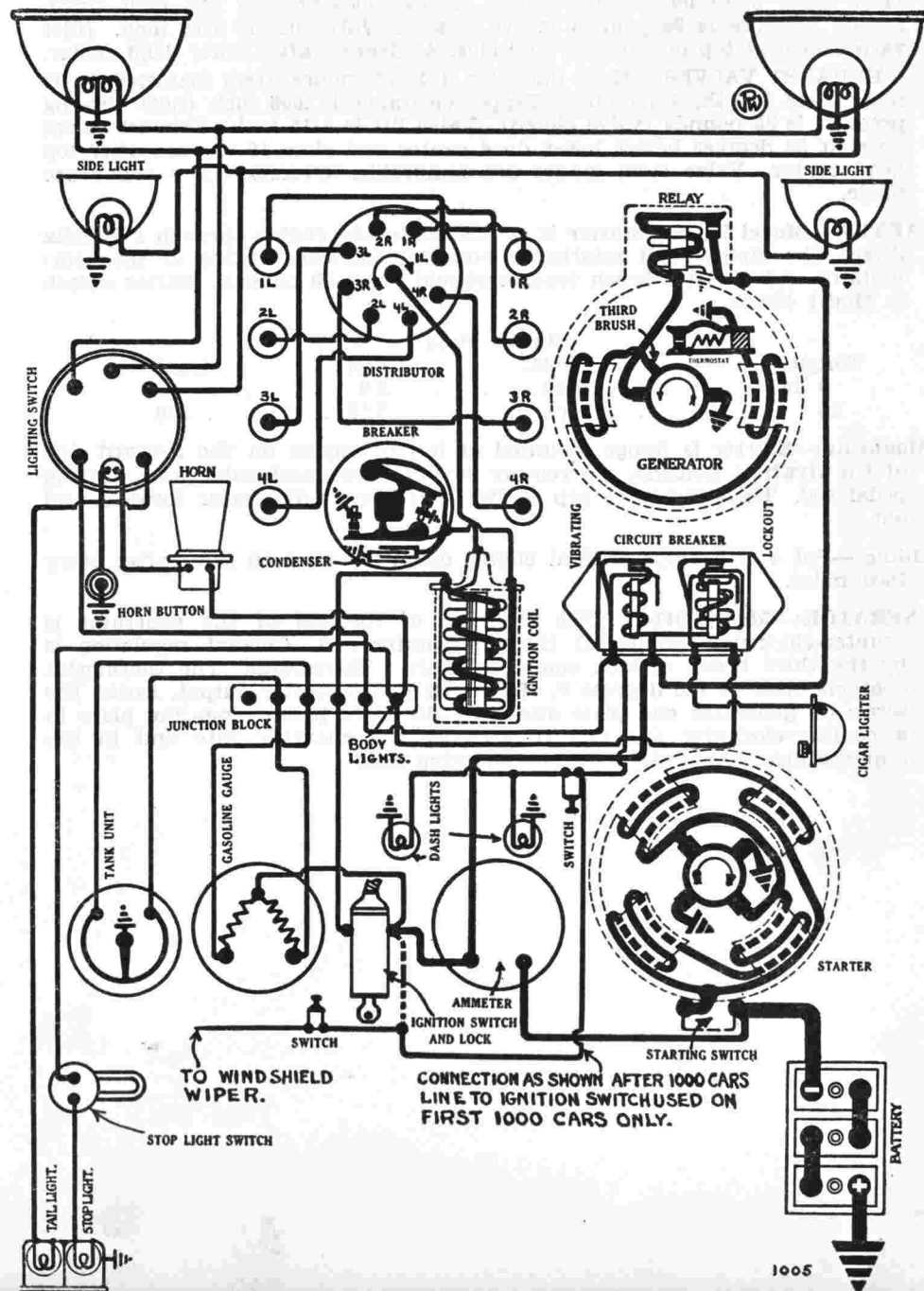
**Mounting:**—Ignition coil is mounted on side of distributor support. Distributor is mounted at front of engine between cylinder banks. A Blossom Coincidental ignition switch is used. To remove the distributor, disconnect the primary feed wire, manual advance rod and remove the distributor cap with the high tension cables attached. Then remove the hold-down screw and lift the distributor from place. (NOTE:—The lower end of the distributor shaft has an offset tongue which fits a groove in the top of the driving shaft. Do not try to force the distributor into place as the tongue may be turned 180 degrees from its correct position.)

**Oiling:**—Put 8 or 10 drops of light engine oil in the oiler on the side of the distributor housing every month or each 1000 miles.

**Timing:**—Synchronization of Contacts:—Use Delco-Remy Tool, Part No. 822572, and follow directions on Page S-30. Synchronizing of contacts is important and synchronization must be checked whenever distributor timing is checked.

**Timing Distributor to Engine:**—One set of breaker contacts begin to separate when the piston entering power stroke reaches a position  $\frac{7}{8}$  inch on the flywheel before top dead center with the spark lever fully advanced. With piston No. 1R in firing position the flywheel mark "IG/A-1-5" will be opposite the indicator on the flywheel case. This mark is  $\frac{7}{8}$  inch before the top dead center mark. To set timing, crank engine over until piston No. 1 enters compression stroke (the up stroke with both valves closed). Fully advance spark lever. Continue to crank engine until the flywheel mark "IG/A-1-5" is opposite the indicator on the case. If contacts do not separate at this point loosen taper screw in center of breaker cam and rotate cam until contacts open. Tighten the screw. The second set of contacts will be open but closing. They will break 45 degrees (distributor) after this point with the flywheel mark "IG/A-2-6" opposite the indicator. Beginning with Series 328, engine unit 400001, high compression heads are standard equipment. The flywheel setting remains the same as for former low compression heads ( $\frac{7}{8}$  of an inch before top dead center). The reason for this same setting is that the new distributor 4041 has different advance characteristics which take care of the high compression heads.

**VALVE TIMING:**—INLET VALVES:—Head diameter,  $1\frac{1}{2}$  inches; stem diameter,  $\frac{3}{8}$  inch; stem length,  $6\frac{17}{64}$  inch. Valve lift,  $25\frac{1}{64}$  inch. Tappet clear-



# LA SALLE

SERIES 328, BEGINNING ENGINE NO. 400001  
PRODUCTION STARTED AUGUST, 1928  
DELCO-REMY GENERATING, STARTING SYSTEM  
DELCO-REMY IGNITION

ance .004 inch (cold). Spring pressure is 156-164 pounds compressed to 2 5/32 of an inch. Inlet valves open 9 1/2 degrees before top dead center and close 58 1/2 degrees after lower dead center. Width of valve seat on cylinder block is 1/16 of an inch.

**EXHAUST VALVES:**—Head diameter, 1 1/2 inches; stem diameter, 3/8 inch; stem length, 6 1/4 inches. Valve lift, 25/64 inch. Tappet clearance .006 inch (cold). Spring pressure, 156-164 pounds compressed to 2 5/32 of an inch. Exhaust valves open 46 degrees before lower dead center and close 5 degrees after top dead center. Width of valve seat on cylinder block 5/64 of an inch.

**Firing Order:**—The firing order is 1L-4R-4L-2L-3R-3L-2R-1R. No. 1 cylinder is nearest the radiator. Right hand block is right viewed from the driver's seat.

**Spark Plugs:**—Spark plugs are 7/8-18 S.A.E. Standard. All engines are equipped with A.C. type Y special high compression or semi-aircraft type plugs. Gaps set at .025-.028 inch.

**STARTER:**—Model 725-C. Starter is connected to the engine through a mechanical gear shift connected to the starting pedal. The direction of rotation is clockwise, looking at the commutator end. Starter brush spring tension is 24-28 ounces.

Starter Data			
Torque	R.P.M.	Volts	Amperes
0 lb. ft.	6000	5	60
16 "	Lock	3	600

**Mounting:**—Starter is mounted on rear of flywheel housing on right side. To remove starter, disconnect cable and starter pedal linkage and remove three flange mounting capscrews. Then slide starter to rear and lift from place.

**Oiling:**—Starter is equipped with oilless bearings. They require no attention.

**GENERATOR:**—Model 384. The direction of rotation is counter-clockwise, looking at the commutator end. Generator current regulation is by third brush shunt field and thermostat. Thermostat contacts open at 165 degrees F.

cutting a resistance in the field circuit and reducing the output approximately 40%. Generator output is adjusted by shifting the third brush. To make this adjustment, loosen the commutator cover band and shift the third brush in a counter-clockwise direction to increase the charging rate and in the opposite direction to decrease the charging rate. The third brush is held in any position by springs. The maximum charging rate is 18-20 amperes reached at 1600 R.P.M. or 22-25 M.P.H.

Generator Data				
Cold Test		Hot Test		
Amperes	Volts	R.P.M.	Amperes	R.P.M.
18-20	8.6	1400	10-12	1600
Third brush shunt field draws 1.8-2.3 amperes at 6 volts. Brush spring tension is 16-20 ounces.				

**Mounting:**—Generator is mounted at right of engine and is driven in tandem with water pump. To remove generator, disconnect battery wire and remove three mounting nuts. Then pull generator to rear.

**Oiling:**—Put 8 or 10 drops of light engine oil in each of the generator bearing oilers every two weeks or each 500 miles.

**RELAY:**—Model 266-N. Relay is mounted on the generator. Relay closes at approximately 8 M.P.H. when the generator voltage reaches 7.75 volts and opens with a discharge current of 0-2.5 amperes. Relay contacts separate .015-.025 inch. Air gap between relay armature and coil core is .014-.021 inch, contacts closed.

**LIGHTING:**—Switch Model 486-D. Lighting switch is mounted at the foot of the steering column. Head lights are 6-8 volt, 21-21 cp (double filament-double contact). Stop light is 6-8 volt, 15 cp. S.C. Side, dash, tail and dome lights are each 6-8 volt, 3 cp. S.C.

**CIRCUIT BREAKER:**—Model 5759. A combined vibrating and lockout circuit breaker is mounted on the dash. The vibrating circuit breaker protects the lighting circuits. It begins to operate with a current of 25-30 amperes and limits the current to 10-15 amperes. The lockout breaker protects the horn, cigar lighter, and stop light circuits. It begins to operate at 25-30 amperes. Current while operating is less than 1 ampere.

# LINCOLN

1928-29

## DELCO-REMY GENERATING, STARTING SYSTEM DELCO-REMY IGNITION

**BATTERY:**—Exide, Type 3-LXRV-15-2, 6 volt, 135 ampere hour. The starting capacity (20 minute rate) is 137 amperes for 20 minutes. Lighting capacity (5 ampere rate) is 5 amperes for 26 hours. The negative (—) terminal is grounded.

**IGNITION:**—Coil Model 2192. Distributor Model 5226. Breaker contacts separate .015-.020 inch. They are made of tungsten. When the condition of the contacts affects the ignition, remove and resurface on a medium hard oilstone. Two sets of contacts are used with a four sided cam. Contacts open alternately at intervals of 30 degrees and 60 degrees corresponding to 60 degrees and 120 degrees of crankshaft rotation. This is the correct firing interval for the Lincoln engine. Contacts must be synchronized (see Timing). Distributor is semi-automatic. Maximum manual advance is 18-23 degrees. Automatic advance begins at 900 R.P.M. and reaches a maximum of 24-28 degrees at 3000 R.P.M. Breaker arm spring tension is 16-20 ounces.

**Oiling:**—Put 3 or 4 drops of light engine oil in the oiler on the side of the distributor housing every 250 miles. Remove the grease plug and pack the gear case with light cup grease to a level just below the cover plate located on the front of the unit near the spark control lever) every 5000 miles. Place a small amount of vaseline or heavy grease on the face of the breaker cam and in the distributor head every 1000 miles. Remove all excess and polish the rotor track with a soft clean cloth.

**Mounting:**—Distributor is mounted at the forward end of the engine. To remove, remove 4 hold-down screws and lift distributor upward and out from position.

**Timing:**—Synchronization of Contacts:—Use Delco Tool, Part No. 822570, and follow direction on Page S-31 to synchronize contacts. Connect a test lamp in each primary circuit to determine accurately when contacts open.

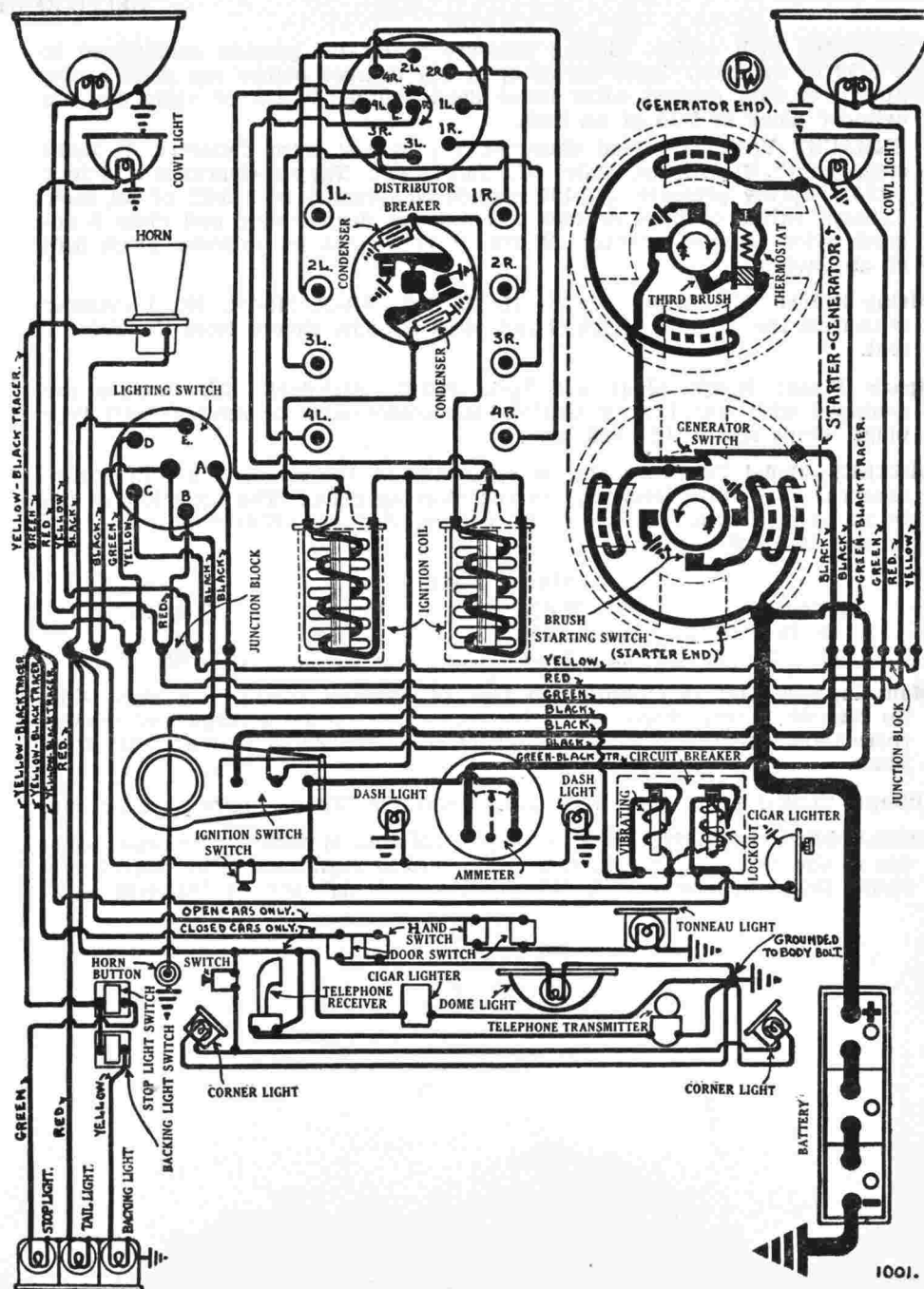
**Timing Distributor:**—Right hand breaker contacts begin to separate when piston No. 1R on compression stroke reaches a position at which the vertical mark preceding the marking 'R1' on the clutch ring is opposite the indicator with the spark control lever in the fully retarded position. This mark is  $\frac{3}{8}$  inch past the 'T.D.C.' mark on the flywheel. This breaker controls the right hand coil and fires the four cylinders of the right hand block. To set timing, loosen lock screws in center of cam and rotate cam until right hand contacts separate. Use a test lamp connected in series with each primary circuit to determine this point. Then tighten lock screw. Connect spark plugs in order around distributor head as shown on diagram.

**Firing Order:**—The firing order is 1R-4L-2R-3L-4R-1L-3R-2L. Cylinder banks are right and left as viewed from driver's seat. No. 1 cylinder is nearest the radiator.

**Spark Plugs:**—Spark plugs are  $\frac{7}{8}$  inch. Gaps are .020-.025 inch.

**VALVE TIMING:**—INLET VALVES:—Head diameter,  $1\frac{7}{8}$  inches; stem diameter,  $\frac{3}{8}$  inch; stem length,  $6\frac{3}{4}$  inches. Tappet clearance, .003-.004 inch (cold). Spring pressure, 85 pounds. Valve lift,  $\frac{5}{16}$  inch. Intake opens  $2\frac{1}{2}$  degrees before top dead center and close 46 degrees after lower dead center.

**EXHAUST VALVES:**—Head diameter,  $1\frac{3}{4}$  inches; stem diameter,  $\frac{3}{8}$  inch; stem length,  $6\frac{3}{4}$  inches. Tappet clearance, .003-.004 inch (cold). Spring pressure, 85 pounds. Valve lift,  $\frac{5}{16}$  inch. Intake opens 48 degrees before lower dead center, and closes at top dead center. Valve stem guides are removable. Oversize valves are not made.





# LINCOLN

1928-29

## DELCO-REMY GENERATING, STARTING SYSTEM DELCO-REMY IGNITION

**STARTER-GENERATOR:—Model 193.** Starter and generator are combined into one unit. Starter is connected to the engine through a set of reduction gears meshed by the operator. Depressing the starter pedal meshes the gears, opens the generator circuit and brings the starter brushes in contact with the commutator, allowing it to crank the engine. When the pedal is released, a spring reverses these operations. Two over-running clutches permit the high speed necessary in cranking the engine and prevent the engine driving the starter. The direction of rotation is counter-clockwise, looking at the starter commutator end. Starter brush tension should be  $2\frac{1}{4}$ - $2\frac{3}{4}$  pounds.

Starter Data			
Torque	R.P.M.	Volts	Amperes
0 lb. ft.	4000	6	60
10 " "	Lock	3	

**GENERATOR:—**Generator current regulation is by the third brush system. To adjust charging rate, loosen cover band on the generator end (front) of unit, exposing the brush regulating lever. Raising the lever increases the charging rate; lowering it decreases the charging rate. Replace the cover band after adjusting. A thermostat mounted with third brush opens at 195-200 degrees F. cutting down the output 30%. The brush tension should be  $1\frac{1}{2}$ - $1\frac{3}{4}$  pounds each.

Generator Data	
Amperes	R.P.M.
3	600
16-18	1400

**Mounting:—**Starter-generator is mounted at right of engine. To remove, drain radiator, disconnect pump shaft, and remove drip pan under starter-generator. Then remove all pump bolts and drop pump down past engine. Remove two cap screws extending through to back of crank case arm holding starter-generator to engine and remove unit by slipping it down past the engine.

**Oiling:—**Put 8 or 10 drops of light engine oil in each of the starter-generator oilers every 500 miles. Once each year, remove, disassemble and clean motor and generator clutches. Repack with vaseline.

**RELAY:—**No relay is used. Generator is connected to the battery through the ignition switch.

**LIGHTING:—**Lincoln Make. Lighting switch is mounted on steering wheel. Head lights are 6-8 volt, 21-21 cp. (double filament-double contact base using 21 cp. filament instead of dimming) Mazda No. 1110. Side lights are 6-8 volt, 6 cp. S.C. Mazda No. 81. Dash and tail lights are 6-8 volt, 3 cp. S.C. Mazda No. 63. Stop and backing lights are 6-8 volt, 21 cp. S.C. Mazda No. 1129.

**CIRCUIT BREAKER:—Model 5770.** Two circuit breakers are mounted on the rear of the dash. A vibrating circuit breaker opens when the current flow reaches 25-30 amperes and continues with a flow of 10-15 amperes. A lock-out circuit breaker operates when the current flow reaches 25-30 amperes and continues with less than 1 ampere.

# MARMON

## MODEL 68 (1929)

### DELCO-REMY GENERATING, STARTING SYSTEM DELCO-REMY IGNITION

**BATTERY:**—Prest-O-Lite, Type 615JFK, 6 volt. The positive (+) terminal is grounded. Starting capacity (20 minute rate) is 120 amperes for 20 minutes. Lighting capacity (5 ampere rate) is 5 amperes for 22 hours. Battery is mounted under the driver's seat on the left side.

**IGNITION:**—Coil Model 525-C. Coil is mounted on the left side of the engine block. Ignition current is 2 amperes at 6 volts with engine running and 5 amperes at 6 volts with engine stopped.

**Distributor Model 658-C.** Breaker contacts separate .022 inch. Resurface contacts with a fine flat contact file or on a medium hard oilstone. Set contact gap by loosening lock screw on stationary contact mounting plate and turning eccentric adjusting screw until gap is .022 inch with breaker arm on lobe of cam. Breaker arm spring tension is 17-21 ounces. Breaker has two sets of contacts on a single four-sided cam. Contacts open alternately at intervals of 45 degrees corresponding to 90 degrees of crankshaft rotation. This is the correct firing interval for the Marmon engine and it must be accurately set. (See Timing.) Distributor is semi-automatic. Maximum manual advance is 20 degrees (engine). Automatic advance begins at 500 R.P.M. of engine. Maximum automatic advance is 25 degrees reached at 2600 R.P.M. of engine. The ignition switch is a Delco-Remy Dual-lock.

**Mounting:**—Distributor is mounted on the top of the engine block. To remove distributor, disconnect primary lead and manual advance rod and (remove distributor head with cables intact. Then remove manual advance stop screw in advance arm and lift distributor from place.

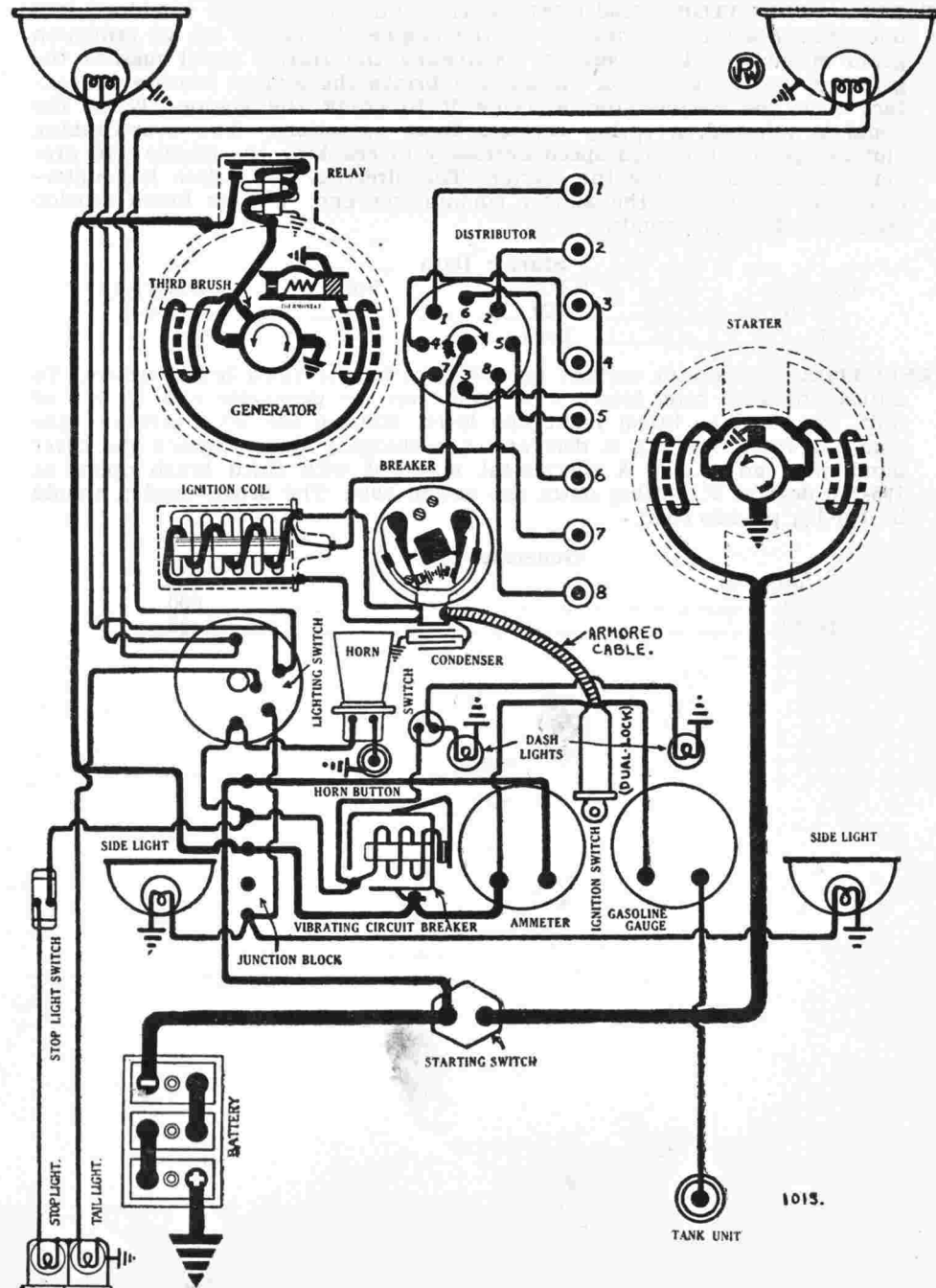
**Oiling:**—Fill the grease cup under the distributor head with medium cup grease and turn down one turn every 750 miles. Once each month remove the distributor head and rotor and saturate the wick oiler in the center of the shaft with light oil.

**Timing:**—Synchronization of Contacts. To synchronize contacts to secure correct firing interval use Delco-Remy tool, Part No. 820738, and follow directions on Page S-31. Contacts can be synchronized without use of the tool after distributor is timed to engine by cranking engine over 90 degrees from firing position of piston No. 1 when piston No. 6 will reach firing position. The second set of contacts should separate at this point. If they do not, loosen lock screws and turn eccentric adjusting screw until contacts begin to separate. Check contact gap with breaker arm on lobe of cam. If it is not within limits of .018-.024 inch, reset at .022 inch and repeat synchronizing operation.

**Timing Distributor to Engine.** Breaker contacts begin to separate when the piston entering power stroke reaches a position 2 teeth on the flywheel before top dead center with the manual advance lever fully advanced. To set timing, crank engine until piston No. 1 enters compression stroke (the upstroke with both valves closed). Fully advance spark control lever. Continue to crank engine until flywheel mark 'IGN' is opposite the pointer on the flywheel case. This mark is two teeth before the top dead center mark on the flywheel. Loosen the advance arm clamp screw and turn the distributor until the contacts begin to separate. Tighten the clamp screw and make certain that the segment opposite the rotor is connected to the spark plug in cylinder No. 1. Connect the remaining spark plugs in order 6-2-5-8-3-7-4 clockwise around the distributor head.

**Firing Order:**—The firing order is 1-6-2-5-8-3-7-4.

**Spark Plugs:**—Spark plugs are  $\frac{7}{8}$ -18 S.A.E. Standard. Gaps are .025 inch.



# MARMON

MODEL 68 (1929)

DELCO-REMY GENERATING, STARTING SYSTEM

DELCO-REMY IGNITION

**VALVE TIMING:**—INLET VALVES:—Head diameter, 1 15/32 inches; stem diameter, 5/16 inch; stem length, 4 61/64 inches. Tappet clearance, .006-.008 inch. Spring pressure, 70 pounds. Valve lift, 21/64 inch. Inlet valves open 6 degrees before top dead center and close 40 degrees after lower dead center.

**EXHAUST VALVES:**—Head diameter, 1 11/32 inches; stem diameter, 5/16 inch; stem length, 4 61/64 inches. Tappet clearance, .006-.008 inch. Spring pressure, 70 pounds. Valve lift, 21/64 inch. Exhaust valves open 40 degrees before lower dead center and close 6 degrees after top dead center. Valve stem guides are not removable. Ovrsize valve stems are not made.

**STARTER:**—Model 714-C. Starter is connected to the engine through a Bendix drive. The direction of rotation is counter-clockwise, looking at the commutator end. Starter brush spring tension is 24-28 ounces.

Starter Data			
Torque	R.P.M.	Volts	Amperes
0 lb. ft.....	5000.....	5 .....	65
12 " .....	Lock.....	3.63.....	475

**Mounting:**—Starter is flange mounted at left of engine on forward side of flywheel housing. To remove starter, disconnect cable and remove 3 flange mounting cap screws. Then pull starter forward and lift from place.

**Oiling:**—Put 4 or 5 drops of light oil in the commutator end oiler every month or each 750 miles. The drive end bearing is oilless.

**GENERATOR:**—Model 949-X. The direction of rotation is counter-clockwise, looking at the commutator end. Generator current regulation is by third brush shunt field combined with a thermostat. Thermostat contacts open at 162°F., cutting the resistance across the thermostat contacts in series with shunt winding and reducing the output approximately 40%. To adjust generator output, loosen the small round-headed screw on the generator end plate and remove the commutator cover band. Then shift the third brush in a counter-clockwise direction to increase the charging rate and in the opposite direction to decrease the charging rate. Tighten the screw after making the adjustment. With standard car setting, the charging rate is 9-12 amperes (hot) reached at 2000 R.P.M. or 25 miles per hour.

## Generator Data

Cold Test			Hot Test		
Amperes	Volts	R.P.M.	Amperes	Volts	R.P.M.
21.....	8.5.....	1450	12.....	7.5.....	2000

Motoring, generator draws 6 amperes at 6 volts. Shunt field current is 5 amperes at 6 volts. Generator brush spring tension is 14-18 ounces.

**Mounting:**—Generator is mounted at left of engine by special swinging bracket and is driven by the fan belt. To remove generator, disconnect lead and remove clamp nut on top front of generator. Swing generator toward engine and slip off fan belt. Remove two bolts from special bracket under generator and lift generator from place.

**To Adjust Fan Belt.** Loosen clamp bolt at top of generator. Swing generator out from engine until proper belt tension is secured. Tighten clamp bolt. Be careful not to make belt too tight. This will cause generator bearing trouble.

**Oiling:**—Put 4 or 5 drops of light engine oil in each of the generator bearing oilers every month or each 750 miles.

**RELAY:**—Model 265-B. Relay is mounted on top of the generator. Relay contacts close at 575 R.P.M. or 10 M.P.H. when the generator voltage reaches 6.75-7.5 volts and open at 8 M.P.H. with a discharge current of 0-2.5 amperes. Charging current is approximately 2 amperes at closing of contacts separate .015-.025 inch. Air gap is .014-.021 inch with contacts closed.

**LIGHTING:**—Briggs and Stratton Switch, Model Special. Switch is located on lower end of steering column. Head lights are 6-8 volt, 21-21 cp. (double filament-double contact base using second 21 cp. filament instead of dimming) Mazda No. 1110. Stop and backing lights are each 6-8 volt, 21 cp. S.C. Mazda No. 1129. Dash and tonneau lights are each 6-8 volt, 3 cp. D.C. Mazda No. 64. Side, tail and dome lights are each 6-8 volt, 3 cp. S.C. Mazda No. 63.

**CIRCUIT BREAKER:**—A vibrating circuit breaker is mounted on the dash. It begins to vibrate when the current reaches 25-30 amperes and continues to vibrate limiting the current to 10-15 amperes until the cause of the excessive current flow is removed.





# MARMON

## MODEL 78 (1929)

### DELCO-REMY GENERATING, STARTING SYSTEM DELCO-REMY IGNITION

**BATTERY:**—Prest-O-Lite, Type 615JFK, 6 volt. The positive (+) terminal is grounded. Starting capacity (20 minute rate) is 120 amperes for 20 minutes. Lighting capacity (5 ampere rate) is 5 amperes for 22 hours. Battery is mounted under the driver's seat.

**IGNITION:**—Coil Model 525-C. Coil is mounted on the left side of the engine block. Ignition current is 2 amperes at 6 volts with engine running and 5 amperes at 6 volts with engine stopped.

**Distributor Model 658-M.** Breaker contacts separate .022 inch. Set contact gap with breaker arm on lobe of cam by loosening lock screw on stationary contact plate and turning eccentric screw until proper gap is obtained. Resurface contacts with a fine flat contact file or on a medium hard oilstone. Breaker arm spring tension is 17-21 ounces. Breaker has two sets of contacts on a single four-sided cam. Contacts open alternately at intervals of 45 degrees corresponding to 90 degrees of crankshaft rotation. This is the correct firing interval for the Marmon engine and it must be accurately set. (See Timing.) Distributor is semi-automatic. Maximum manual advance is 20 degrees (engine). Automatic advance begins at 600 R.P.M. of engine. Maximum automatic advance is 42.5 degrees reached at 3000 R.P.M. of engine. The ignition switch is Delco-Remy Dual-lock Model 425-F.

**Mounting:**—Distributor is mounted on special flange at left side of engine block. To remove distributor, disconnect primary lead and manual advance rod and remove head with cables intact. Then remove manual advance stop screw in advance arm and lift distributor from place.

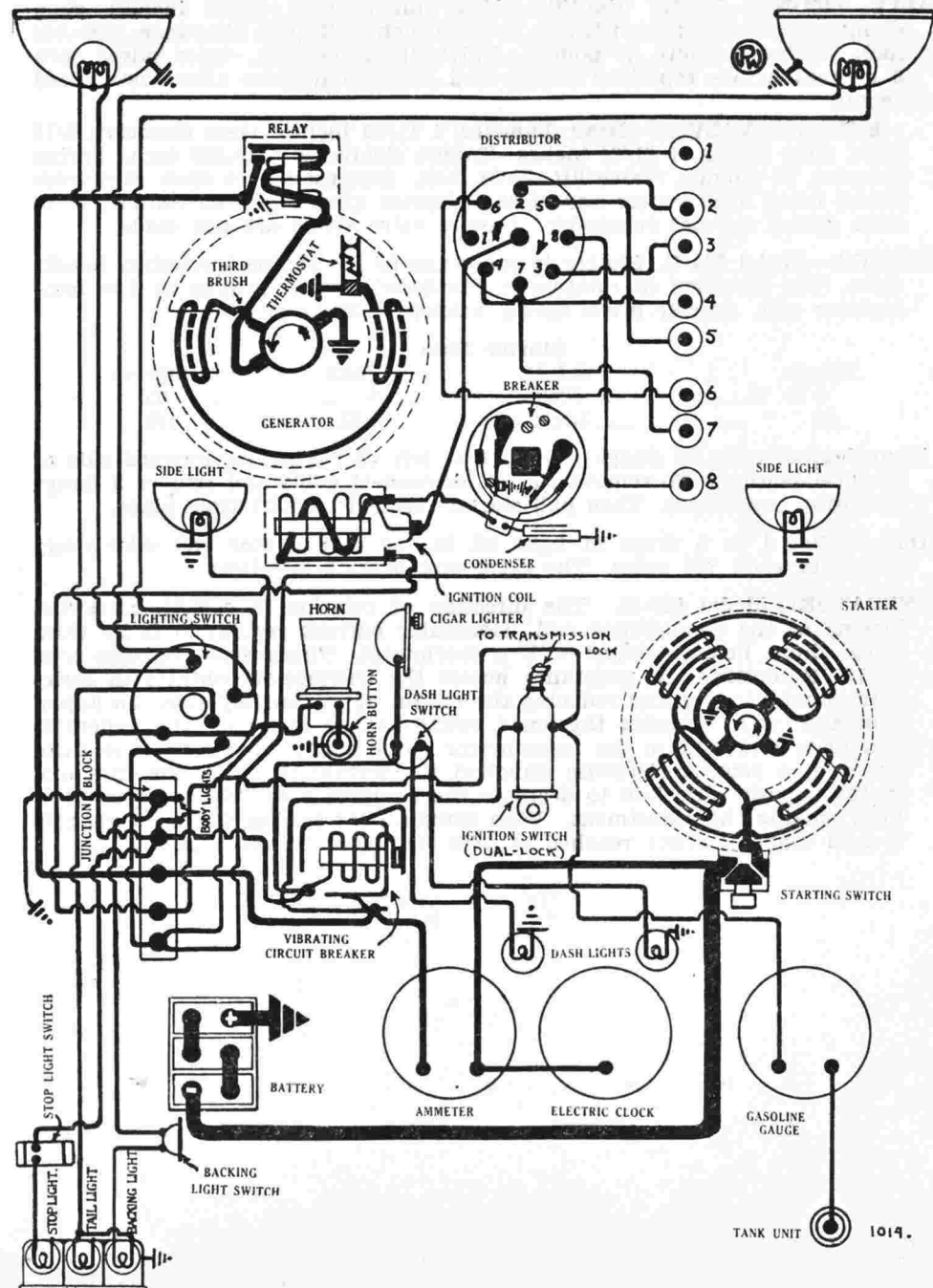
**Oiling:**—Fill the grease cup on the side of the distributor shaft with medium cup grease and turn down one turn every month or each 750 miles. Once each month remove the distributor head and rotor and saturate the wick oiler in the center of the shaft with light oil.

**Timing:**—Synchronization of Contacts. To synchronize contacts to secure correct firing interval, use Delco-Remy tool, Part 820738, and follow directions on Page S-31. Contacts can be synchronized without use of the tool after distributor has been timed to the engine by cranking engine over 90 degrees from firing position of No. 1 piston when piston No. 6 will reach firing position. The second set of contacts should separate at this point. Loosen lock screws and turn eccentric adjusting screw until contacts begin to separate. Tighten the lock screws and check the contact gap. If it is outside limits of .018-.024 inch with breaker arm on lobe of cam, reset at .022 inch and repeat synchronizing operation.

**Timing Distributor to Engine:**—Breaker contacts begin to separate when the piston entering power stroke reaches a position  $7\frac{1}{2}$  degrees or two teeth on the flywheel before top dead center with the spark control lever in the fully advanced position. To set timing, crank engine over until piston No. 1 enters compression stroke (the up stroke with both valves closed). Fully advance spark lever. Continue to crank engine until a point on the flywheel two teeth before the top dead center mark 'DC1-8' is opposite the indicator on the flywheel housing. Loosen the advance arm clamp screw and rotate the distributor housing until one set of contacts begin to separate. Tighten the clamp screw and make certain that the rotor is opposite the segment connected to the spark plug in cylinder No. 1. Connect the remaining spark plugs in order 6-2-5-8-3-7-4 clockwise around the distributor head.

**Firing Order:**—The firing order is 1-6-2-5-8-3-7-4.

**Spark Plugs:**—Spark plugs are  $\frac{7}{8}$ -S.A.E. Standard. Gaps are .025 inch.



# MARMON

MODEL 78 (1929)

## DELCO-REMY GENERATING, STARTING SYSTEM DELCO-REMY IGNITION

**VALVE TIMING:**—INLET VALVES:—Head diameter, 1 29/64 inches; stem diameter, 5/16 inch; stem length, 5 23/32 inches. Valve lift, 21/64 inch. Spring pressure, 130 pounds. Tappet clearance, .008 inch. Inlet valves open 6 degrees before top dead center and close 40 degrees after lower dead center.

**EXHAUST VALVES:**—Head diameter, 1 17/64 inches; stem diameter, 5/16 inch; stem length, 5 23/32 inches. Valve lift, 21/64 inch. Spring pressure, 130 pounds. Tappet clearance, .008 inch. Exhaust valves open 40 degrees before lower dead center and lose 6 degrees after top dead center. Valve stem guides are not removable. Oversize valve stems are not made.

**STARTER:**—Model 724-G. Starter is connected to the engine through a manually operated pinion shift connected to the starting switch. The direction of rotation is clockwise, looking at the commutator end. Starter brush spring tension should be 24-28 ounces.

Starter Data			
Torque	R.P.M.	Volts	Amperes
0 lb. ft.	3500	5	70
22 "	Lock	3	600

**Mounting:**—Starter is flange mounted at right of engine on forward side of flywheel housing. To remove starter, disconnect cable and pedal rod and remove nuts from three flange mounting bolts. Then slide starter forward and lift from place.

**Oiling:**—Put 4 or 5 drops of light engine oil in each of the starter bearing oilers every month or each 750 miles. Every six months remove the grease plug in the reduction gear case and repack the gear compartment with graphite grease.

**GENERATOR:**—Model 949-F. The direction of rotation is counter-clockwise, looking at the commutator end. Generator current regulation is by third brush shunt field and thermostat. Thermostat contacts open at 162°F. cutting the resistance across the thermostat contacts in series with the shunt field and reducing the output approximately 40%. To adjust generator output, loosen the small round-headed screw on the generator end plate and remove the commutator cover band. Then shift the third brush in a counter-clockwise direction to increase the charging rate and in the opposite direction to decrease the charging rate. Tighten the screw after making

the adjustment. With standard car setting, the charging rate is 12 amperes (hot) reached at 2000 R.P.M. or approximately 25 miles per hour.

### Generator Data

Cold Test			Hot Test		
Amperes	Volts	R.P.M.	Amperes	Volts	R.P.M.
21	8.5	1450	9-12	7.5	2000

Motoring, generator draws 6 amperes at 6 volts. Shunt field current is 5 amperes at 6 volts. Generator brush spring tension is 14-18 ounces.

**Mounting:**—Generator is cradle mounted at left of engine and is driven by the fan belt. To remove generator, disconnect water pump drive coupling and remove nut from stud on generator strap. Then slip off fan belt and lift generator from place.

**Fan Belt Adjustment.** The tension of the fan belt must be sufficient to drive both the fan and generator without slipping. To tighten fan belt, loosen three cap screws in fan lock ring and rotate eccentric fan adjuster by means of a punch or pin inserted in the fan ring holes until the proper belt tension is obtained. Then tighten the 3 cap screws.

**RELAY:**—Model 265-B. Relay is mounted on top of the generator. Relay closes at 575 R.P.M. or 10 M.P.H. when the generator voltage reaches 6.75-7.5 volts and opens at 8 M.P.H. with a discharge current of 0-2.5 amperes. Charging current at closing of contacts is approximately 2 amperes. Relay contacts separate .015-.025 inch. Air gap is .014-.021 inch with contacts closed.

**LIGHTING:**—Briggs and Stratton Switch, Special Model . Switch is mounted at lower end of steering column. Head lights are 6-8 volt, 21-21 cp. (double filament-double contact base using second 21 cp. filament instead of dimming) Mazda No. 1110. Stop and backing lights are each 6-8 volt, 21 cp. S.C. Mazda No. 1129. Side, dash and tail lights are each 6-8 volt, 3 cp. S.C. Mazda No. 63. Dome and tonneau lights are each 6-8 volt, 3 cp. D.C. Mazda No. 64.

**CIRCUIT BREAKER:**—Model 410-C. A vibrating circuit breaker is mounted on the dash. It begins to vibrate with a current of 25-30 amperes and continues to vibrate limiting the current to 10-15 amperes until the cause of the excessive current flow is removed.

# NASH

## STANDARD SIX "400" SERIES

### PRODUCTION STARTED APRIL 1928

### AUTO-LITE GENERATING, STARTING SYSTEM

### AUTO-LITE IGNITION

**BATTERY:**—U.S.L. Type 3-HVX-5X6, 6 volt. The negative (—) terminal is grounded. Starting capacity (20 minute rate) is 105 amperes for 20 minutes. Lighting capacity (5 ampere rate) is 5 amperes for 18.4 hours. Battery is mounted under the front floor boards on the left frame member.

**IGNITION:**—Coil Model IG-4065. Coil is mounted on top of the engine. Ignition current is 1-3 amperes at 6 volts with engine running and 3-4.5 amperes at 6 volts with engine stopped.

**Distributor Model IGB-4015.** Breaker contacts separate .020-.024 inch with breaker arm on lobe of cam. Resurface contacts with a fine flat contact file or on a medium hard oilstone. Distributor is of the automatic type. Automatic advance begins at 400 R.P.M. of the engine. Maximum automatic advance is 30 degrees (engine) reached at 3380 R.P.M. Breaker arm spring tension should be 18-20 ounces.

**Mounting:**—Distributor is mounted on top of the cylinder block. To remove distributor, disconnect primary lead and remove distributor head with cables intact. Then remove set screw and lock nut on side of distributor shaft housing and lift distributor from place.

**Oiling:**—Fill the oiler on the side of the distributor housing with light engine oil every 500 miles. Put one drop of oil on the breaker arm pivot pin and put a small amount of vaseline on the face of the breaker cam every 1000 miles.

**Timing:**—Breaker contacts begin to separate when the piston entering power stroke reaches a position  $\frac{1}{2}$  inch (on the flywheel) before top dead center. To check timing, crank engine over until piston No. 1 is coming up on the compression stroke. This is the up stroke with both valves closed. Continue to crank engine until piston reaches a position  $\frac{1}{2}$  inch before the notch on the front face of the flywheel reaches the indicator on the rear engine support. Breaker contacts should separate at this point. If they do not, loosen the clamp screw and rotate distributor until contacts open. Tighten the screw after making the adjustment.

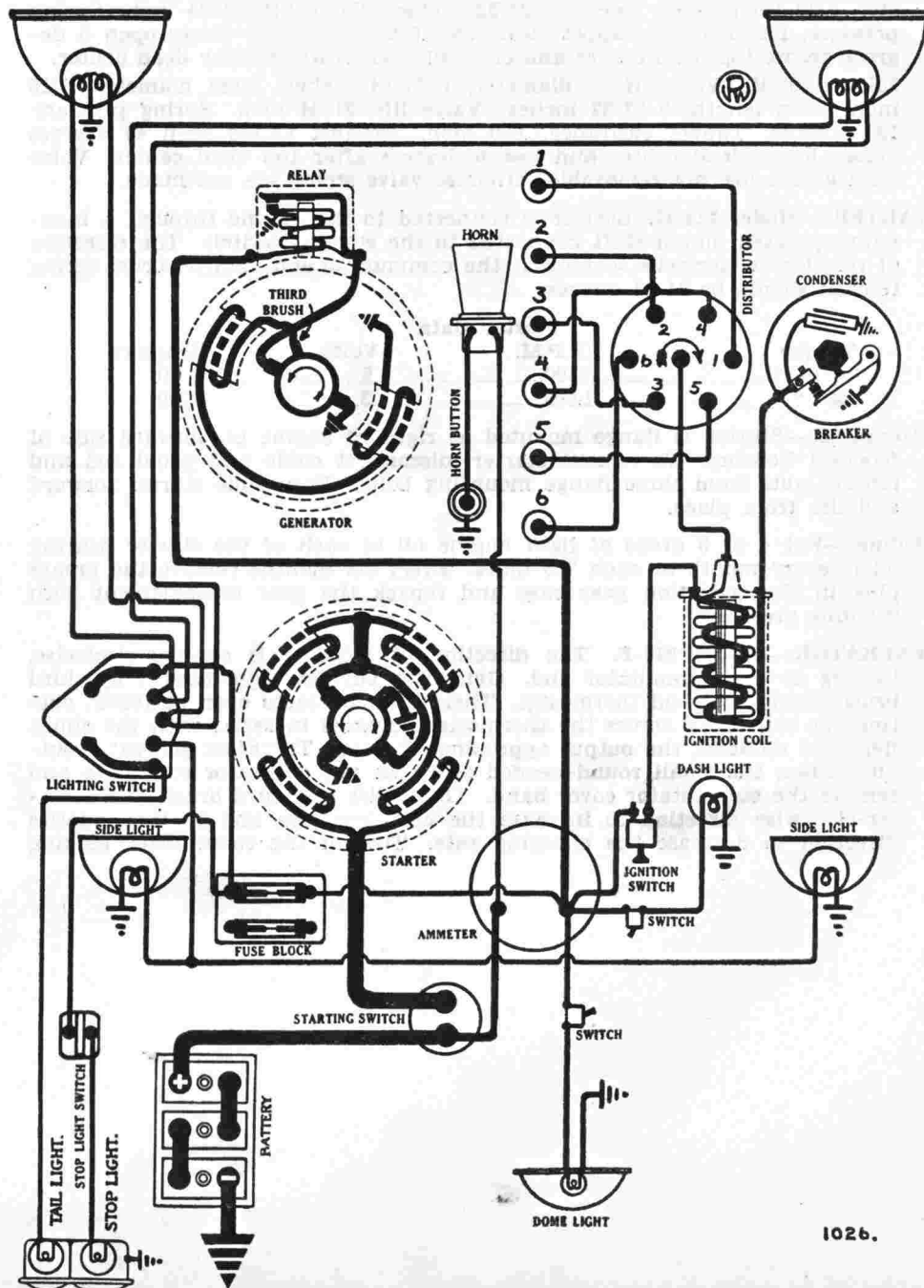
**Firing Order:**—The firing order is 1-5-3-6-2-4.

**Spark Plugs:**—Spark plugs are Aircraft Metric. Gaps are .020-.030 inch.

**VALVE TIMING:**—**INLET VALVES:**—Head diameter is  $1 \frac{13}{32}$  inches; stem diameter is .310 inch; stem length is  $4 \frac{5}{16}$  inches. Tappet clearance is .006 inch (hot). Spring pressure is 65-44 pounds. Valve lift is .3125 inch. Inlet valves open at 5 degrees after top dead center and close at 45 degrees after lower dead center.

**EXHAUST VALVES:**—Head diameter is  $1 \frac{13}{32}$  inches; stem diameter is .310 inch; stem length is  $4 \frac{5}{16}$  inches. Tappet clearance is .006 inch (hot). Spring pressure is 65-44 pounds. Valve lift is .3125 inch. Exhaust valves open at 45 degrees before lower dead center and close at 5 degrees after top dead center. Valve stem guides are removable. Oversize valve stems are not made.

**STARTER:**—Model MAC-4213. Starter is connected to the engine through a Bendix drive. The direction of rotation is counter-clockwise, looking at the commutator end. Starter switch is Model SW-4001.





# NASH

## STANDARD SIX "400" SERIES

### PRODUCTION STARTED APRIL 1928

### AUTO-LITE GENERATING, STARTING SYSTEM

### AUTO-LITE IGNITION

#### Starter Data

Torque	R.P.M.	Volts	Amperes
.5 lb. ft.	2500	5.5	100
2.7 "	1400	5.0	200
5.0 "	900	4.5	300
7.7 "	500	4.0	400
10.6 "	160	3.5	500

Starter brush spring tension is  $1\frac{3}{4}$ - $2\frac{1}{4}$  pounds.

**Mounting:**—Starter is flange mounted at left of engine on forward side of fly-wheel housing. To remove starter, disconnect cable and remove flange mounting screws. Pull starter forward and out.

**Oiling:**—Put 5 or 6 drops of light oil in the oiler on the commutator end of the starter every month or each 1000 miles. The drive end bearing is oilless. It requires no attention.

**GENERATOR:**—Model GAL-4111. The direction of rotation is counter-clockwise, looking at the commutator end. Generator current regulation is by third brush shunt field. To adjust generator output, loosen the commutator cover band and shift the third brush and mounting plate by tapping on the mounting stud with a screwdriver. Shift the third brush in a counter-clockwise direction to increase the charging rate and in the opposite direction to decrease the charging rate. The third brush is held in any position by friction between the mounting stud and the end plate. With standard car setting the maximum charging rate is 17 amperes at 8 volts reached at 2075 R.P.M. or 24 miles per hour.

#### Generator Data

Amperes	Volts	R.P.M.
2	6.4	675
6	6.9	835
10	7.3	1025
14	7.65	1275
17.2	8.0	2075
14	7.65	2925

Brush spring tension is 24-32 ounces. Generator motoring, draws 4.7-5.7 amperes at 6 volts. Shunt field current is 4.2 amperes at 6 volts.

**Mounting:**—Generator is flange mounted at the left of the engine on the rear of the front engine cross member. Generator is belt driven from crankshaft. To remove generator, remove belt pulley and bolts in flange mounting. Pull generator to rear and lift from place.

**Oiling:**—Put 4 or 5 drops of light engine oil in each of the generator bearing oilers every 500 miles.

**RELAY:**—Model CB-4014. Relay is mounted on top of the generator. Contacts close at 675 R.P.M. or 9-9.5 miles per hour when the generator voltage reaches 7-7.5 volts. The charging current at closing of contacts is approximately 2 amperes. Contacts open with a discharge current of .5-2.5 amperes. Relay contacts separate .025-.035 inch. Air gap between relay armature and coil core is .010-.030 inch with contact closed.

**LIGHTING:**—Briggs and Stratton Switch Model 40153. Lighting switch is mounted at the base of the steering column. Head lights are 6-8 volt, 21-21 cp. (double filament-double contact) Mazda 1110. Side, dash, tail and dome lights are 6-8 volt, 3 cp. S.C. Mazda 63. Stop light is 6-8 volt, 15 cp. S.C. Mazda 87.

**FUSES:**—Lighting fuse is mounted on the dash. It is 20 ampere capacity.

# NASH

## ADVANCED SIX "400" SERIES

### PRODUCTION STARTED APRIL 1928

### AUTO-LITE GENERATING, STARTING SYSTEM

### AUTO-LITE IGNITION

**BATTERY:—U.S.L., Type 3-HVX-5X6,** 6 volt. The positive (+) terminal is grounded. Starting capacity (20 minute rate) is 105 amperes for 20 minutes. Lighting capacity (5 ampere rate) is 5 amperes for 18.4 hours. The battery is mounted under the front seat.

**IGNITION:—Coil Model IG-4065.** There are two coils used with a dual ignition distributor. The ignition current of each coil is 1-3 amperes at 6 volts with engine running and 3-4.5 amperes at 6 volts with engine stopped. Coils are mounted at the right of the engine.

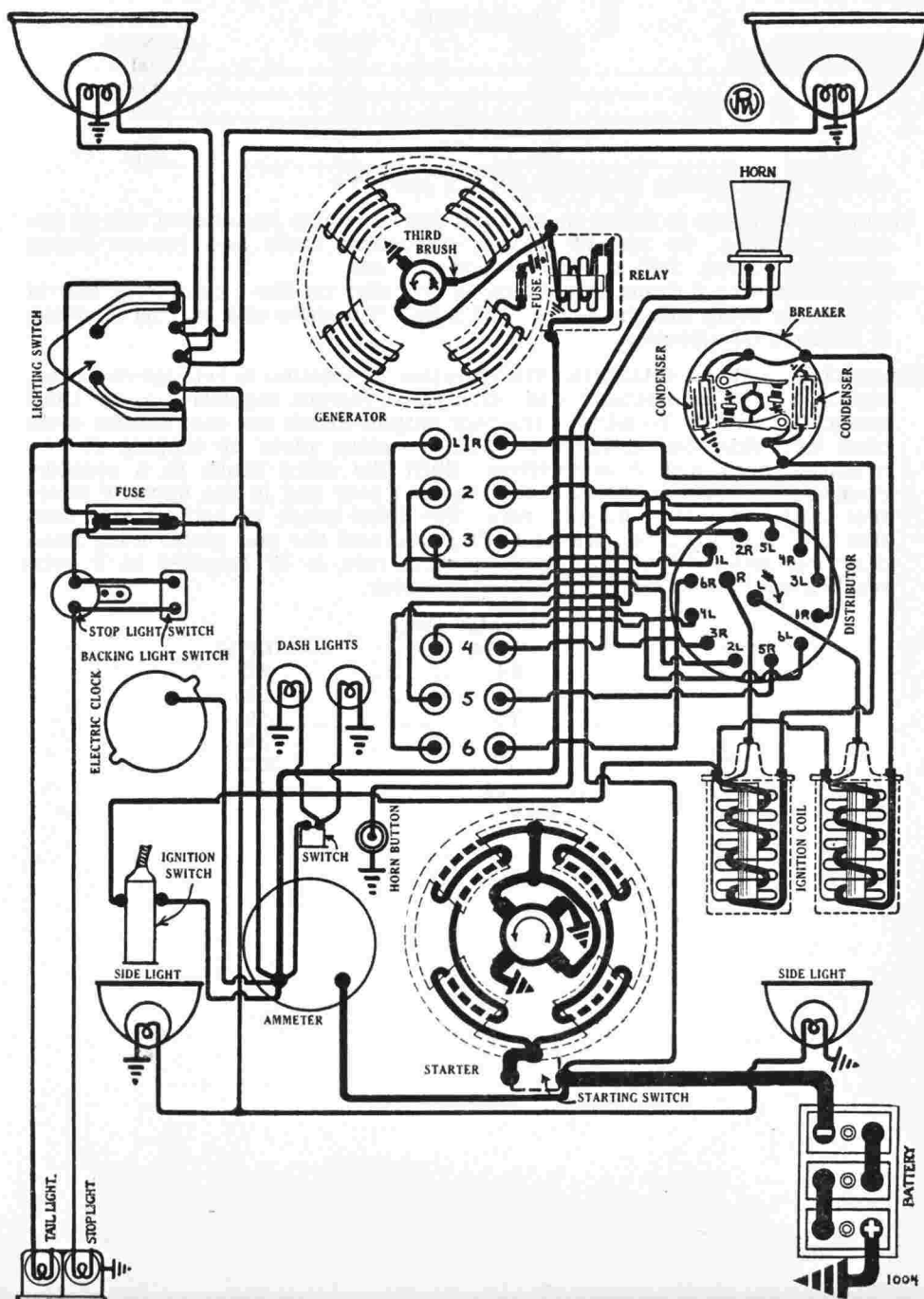
**Distributor Model IGE-4001.** This is a dual ignition type distributor using a single cam with two sets of breaker contacts which control independent circuits using separate coils and condensers and firing separate sets of spark plugs. It is very important that these contacts be synchronized to open simultaneously so that the full benefit of the dual ignition will be maintained. See Timing. Breaker contacts separate .018-.020 inch with breaker arm on lobe of cam. Breaker arm spring tension is 20 ounces. Distributor is semi-automatic. Manual advance is 28 degrees (engine). Automatic advance begins at 600 R.P.M. Maximum automatic advance is 30 degrees (engine) reached at 2100 R.P.M.

**Mounting:—Distributor** is mounted at the right of the engine. To remove, disconnect primary lead and manual advance rod. Remove distributor head with high tension cables intact. Remove manual advance stop screw and lift distributor from place.

**Oiling:—Put 8 or 10 drops of light engine oil** in the oiler on the outside of the distributor and also on the felt wick in the top of the cam and stop-plate assembly (found by removing the rotor) every 500 miles. Put a small bit of vaseline on the breaker cam every 5000 miles or twice a year.

**Timing:—Synchronization of Contacts:—Synchronize** contacts before setting timing. Two sets of contacts are used on a single six sided cam. They must open at the same instant to fire both spark plugs in each cylinder simultaneously. Connect a six volt lamp in each primary circuit. Crank engine slowly. Both lamps should go out at the same instant. If they do not, contacts must be synchronized. To synchronize contacts, loosen the 3 lock screws and turn the eccentric adjusting screw until contacts separate. Tighten the screws and check the contact gap. It must be within the limits of .018-.020 inch. This is important to secure correct high speed performance of car.

**Timing Distributor to Engine:—Breaker** contacts begin to separate when the piston entering power stroke reaches a position  $1 \frac{1}{10}$  inches before top dead center with the spark control lever in the fully advanced position. To check timing, crank engine over until piston No. 1 is coming up on the compression stroke. This is the up stroke with both valves closed. Continue to crank engine until piston reaches a position  $1 \frac{1}{10}$  inches before top dead center when the mark 'IGN' on the vibration damper at the front of the engine will be opposite the pressed steel pointer. Contacts should separate at this point. If they do not, loosen the advance arm clamp screw and rotate distributor until contacts open. The ammeter reading with both contacts open should be 8-10 amperes. If the reading is but 4 or 5 amperes the contacts must be synchronized. Tighten the clamp screw after making the adjustment and make certain that the rotor is opposite the segments connected to the spark plugs in cylinder No. 1 and connect the remaining plugs in order around the distributor head.



# N A S H

## ADVANCED SIX "400" SERIES

### PRODUCTION STARTED APRIL 1928

### AUTO-LITE GENERATING, STARTING SYSTEM

### AUTO-LITE IGNITION

**Firing Order:**—The firing order is 1-5-3-6-2-4.

**Spark Plugs:**—Spark plugs are Aircraft Metric. Gaps are .020-.030 inch.

**VALVE TIMING:**—**INLET VALVES:**—Head diameter is 1 25/32 inches; stem diameter is .3725-.3715 inch; stem length is 4 3/8 inches. Tappet clearance is .008 inch (hot). Outer spring pressure is 78-45 pounds. Inner spring pressure is 19-15 pounds. Valve lift is .348 inch. Inlet valves open 15 degrees after top dead center and close 38 degrees after lower dead center.

**EXHAUST VALVES:**—Head diameter is 1 25/32 inches; stem diameter is .3725-.3715 inch; stem length is 4 3/8 inches. Tappet clearance is .012 inch (hot). Outer spring pressure is 78-45 pounds. Inner spring pressure is 19-15 pounds. Valve lift is .348 inch. Exhaust valves open 45 degrees before lower dead center and close 10 degrees after top dead center. Valve stem guides are removable. Oversize valve stems are not made.

**STARTER:**—**Model MAD-4102.** Starter is connected to the engine through a Bendix drive. The direction of rotation is counter-clockwise, looking at the commutator end.

Starter Data			
Torque	R.P.M.	Volts	Amperes
.4 lb. ft.	2500	5.5	100
2.7 "	1350	5.0	200
5.3 "	815	4.5	300
8.5 "	425	4.0	400

Starter brush spring tension should be 1 3/4-2 1/4 pounds.

**Mounting:**—Starter is sleeve mounted at the right of the engine on the forward side of the flywheel housing. To remove starter, disconnect cable and remove large pilot mounting screw. Pull starter forward and lift from place.

**Oiling:**—Starter bearings are oilless. They require no attention.

**GENERATOR:**—**Model GAO-4101.** The direction of rotation is counter-clockwise, looking at the commutator end. Generator current regulation is by third brush shunt field. To adjust generator output, remove commutator cover band and shift third brush and mounting bracket by tapping on mounting stud with a screwdriver. Shift the third brush in a counter-clockwise direction to increase the charging rate and in the opposite direc-

tion to decrease the charging rate. The third brush is held in any position by friction between the mounting stud and the end plate. With standard car setting, the maximum charging rate is 18 amperes at 8 volts reached at 1700 R.P.M. or 24 miles per hour.

Generator Data		
Amperes	Volts	R.P.M.
2	6.4	630
6	6.9	760
10	7.3	900
14	7.65	1060
18	8	1700
14	7.65	2700

Generator motoring, draws 3.5 amperes at 6 volts. Shunt field current is 2.55 amperes at 6 volts. Generator brush spring tension is 24-32 ounces.

**Mounting:**—Generator is mounted at the front of the engine and is driven by the fan belt. To remove generator, remove the flange mounting screws holding generator in position and lower generator. This will permit removal of the belt. Then lift generator from position.

**Oiling:**—Put 8 or 10 drops of light engine oil in each of the generator oilers every two weeks or each 500 miles if the car is driven more than 500 miles in two weeks.

**RELAY:**—**Model CB-4014.** Relay is mounted on the generator. Relay contacts close when the generator voltage reaches 7-7.5 volts reached at 630 R.P.M. or 7-8 miles per hour. The charging current at closing of contacts is 2 amperes. Discharge current at opening of contacts is 0-2.5 amperes. Contact gap is .025-.035 inch. Air gap between relay armature and coil core is .010-.030 inch with contacts closed.

**LIGHTING:**—**Briggs and Stratton Switch Model 40153.** Head lights are 6-8 volt, 21-21 cp. (double filament-double contact) Mazda 1110. Side, dash, tail and tonneau lights are 6-8 volt, 3 cp. S.C. Mazda 63. Dome light is 6-8 volt, 6 cp. S.C. Mazda 81. Stop light is 6-8 volt, 15 cp. S.C. Mazda 87. Lighting switch is mounted at the base of the steering column.

**FUSES:**—Lighting fuse is mounted on the dash. It is 20 ampere capacity.



# NASH

## SPECIAL SIX "400" SERIES

### PRODUCTION STARTED APRIL 1928

#### AUTO-LITE GENERATING, STARTING SYSTEM AUTO-LITE IGNITION

**BATTERY:**—U.S.L., Type 3-HVX-5X6, 6 volt. The positive (+) terminal is grounded. Starting capacity (20 minute rate) is 105 amperes for 20 minutes. Lighting capacity (5 ampere rate) is 5 amperes for 18.4 hours. The battery is mounted under the front seat.

**IGNITION:**—Coil Model IG-4065. There are two coils used with a dual ignition distributor. The ignition current of each coil is 1-3 amperes at 6 volts with engine running and 3-4.5 amperes at 6 volts with engine stopped. Coils are mounted at the right of the engine.

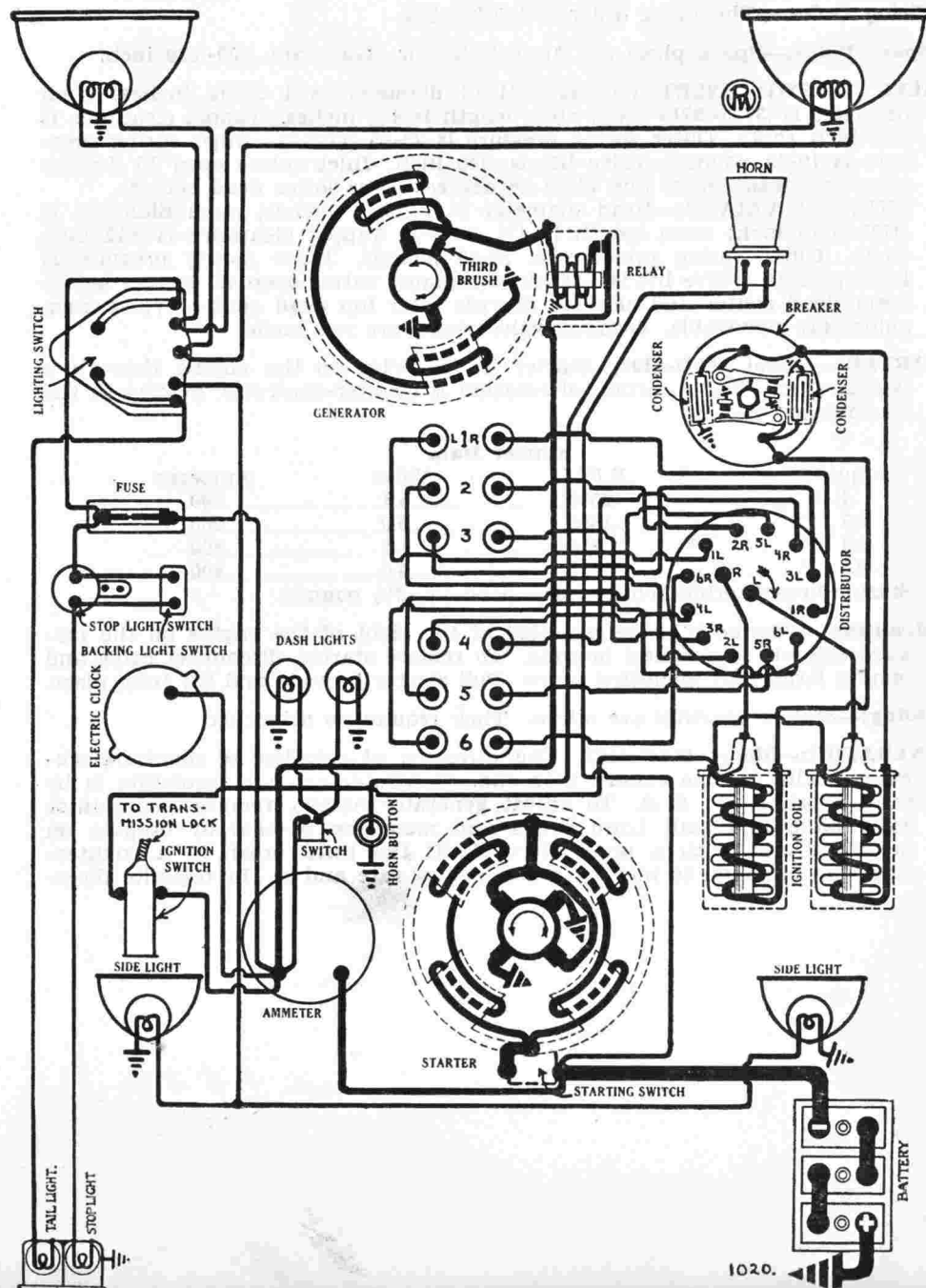
**Distributor Model IGE-4002.** This is a dual ignition type distributor using a single cam with two sets of breaker contacts which control independent circuits using separate coils and condensers and firing separate sets of spark plugs. It is very important that these contacts be synchronized to open simultaneously so that the full benefit of the dual ignition will be maintained. See Timing. Breaker contacts separate .018-.020 inch with breaker arm on lobe of cam. Breaker arm spring tension is 20 ounces. Distributor is semi-automatic. Manual advance is 33 degrees (engine). Automatic advance begins at 600 R.P.M. Maximum automatic advance is 30 degrees (engine) reached at 2100 R.P.M.

**Mounting:**—Distributor is mounted at the right of the engine. To remove, disconnect primary lead and manual advance rod. Remove distributor head with high tension cables intact. Remove manual advance stop screw and lift distributor from place.

**Oiling:**—Put 8 or 10 drops of light engine oil in the oiler on the outside of the distributor and also on the felt wick in the top of the cam and stop-plate assembly (found by removing the rotor) every 500 miles. Put a small bit of vaseline on the breaker cam every 5000 miles or twice a year.

**Timing:**—Synchronization of Contacts:—Synchronize contacts before setting timing. Two sets of contacts are used on a single six sided cam. They must open at the same instant to fire both spark plugs in each cylinder simultaneously. Connect a six volt lamp in each primary circuit. Crank engine slowly. Both lamps should go out at the same instant. If they do not, contacts must be synchronized. To synchronize contacts, loosen the 3 lock screws and turn the eccentric adjusting screw until contacts separate. Tighten the screws and check the contact gap. It must be within the limits of .018-.020 inch. This is important to secure correct high speed performance of car.

**Timing Distributor to Engine:**—Breaker contacts begin to separate when the piston entering power stroke reaches a position  $1 \frac{1}{10}$  inches before top dead center with the spark control lever in the fully advanced position. To check timing, crank engine over until piston No. 1 is coming up on the compression stroke. This is the up stroke with both valves closed. Continue to crank engine until piston reaches a position  $1 \frac{1}{10}$  inches before top dead center when the mark 'IGN' on the vibration damper at the front of the engine will be opposite the pressed steel pointer. Contacts should separate at this point. If they do not, loosen the advance arm clamp screw and rotate distributor until contacts open. The ammeter reading with both contacts open should be 8-10 amperes. If the reading is but 4 or 5 amperes the contacts must be synchronized. Tighten the clamp screw after making the adjustment and make certain that the rotor is opposite the segments connected to the spark plugs in cylinder No. 1 and connect the remaining plugs in order around the distributor head.



# NASH

## SPECIAL SIX "400" SERIES

### PRODUCTION STARTED APRIL 1928

### AUTO-LITE GENERATING, STARTING SYSTEM

### AUTO-LITE IGNITION

**Firing Order:**—The firing order is 1-5-3-6-2-4.

**Spark Plugs:**—Spark plugs are Aircraft Metric. Gaps are .020-.030 inch.

**VALVE TIMING:**—**INLET VALVES:**—Head diameter is 1½ inches; stem diameter is .3725-.3715 inch; stem length is 4¼ inches. Tappet clearance is .008 inch (hot). Outer spring pressure is 78-45 pounds. Inner spring pressure is 19-15 pounds. Valve lift is .348 inch. Inlet valves open at 15 degrees after top dead center and close at 38 degrees after lower dead center. **EXHAUST VALVES:**—Head diameter is 1½ inches; stem diameter is .3725-.3715 inch; stem length is 4¼ inches. Tappet clearance is .012 inch (hot). Outer spring pressure is 78-45 pounds. Inner spring pressure is 19-15 pounds. Valve lift is .348 inch. Exhaust valves open at 45 degrees before lower dead center and close at 10 degrees after top dead center. Valve stem guides are removable. Oversize valve stems are not made.

**STARTER:**—Model MAD-4102. Starter is connected to the engine through a Bendix drive. The direction of rotation is counter-clockwise, looking at the commutator end.

Starter Data			
Torque	R.P.M.	Volts	Amperes
.4 lb. ft.	2500	5.5	100
2.7 "	1350	5.0	200
5.3 "	815	4.5	300
8.5 "	425	4.0	400

Starter brush spring tension should be 1¾-2¼ pounds.

**Mounting:**—Starter is sleeve mounted at the right of the engine on the forward side of the flywheel housing. To remove starter, disconnect cable and remove large pilot mounting screw. Pull starter forward and lift from place.

**Oiling:**—Starter bearings are oilless. They require no attention.

**GENERATOR:**—Model GAL-4108. The direction of rotation is counter-clockwise, looking at the commutator end. Generator current regulation is by third brush shunt field. To adjust generator output, loosen the commutator cover band and shift the third brush and mounting plate by tapping on the mounting stud with a screwdriver. Shift the third brush in a counter-

clockwise direction to increase the charging rate and in the opposite direction to decrease the charging rate. The third brush is held in any position by friction between the mounting stud and the end plate. The maximum charging rate is 17 amperes at 8 volts reached at 2075 R.P.M. or 27 miles per hour.

#### Generator Data

Amperes	Volts	R.P.M.
2	6.4	675
6	6.9	835
10	7.3	1025
14	7.65	1275
17.2	8.0	2075
14	7.65	2925

Brush spring tension is 24-32 ounces. Generator motoring, draws 4.7-5.7 amperes at 6 volts. Shunt field current is 4.2 amperes at 6 volts.

**Mounting:**—Generator is cradle mounted at the left and to the front of the engine and is belt driven. To remove generator, disconnect lead and slip off belt. Loosen clamp band and slide generator from place.

**Oiling:**—Put 8 or 10 drops of light engine oil in each of the generator oilers every two weeks or each 500 miles.

**RELAY:**—Model CB-4011. Relay is mounted on the generator. Relay contacts close when the generator voltage reaches 7-7.5 volts at 675 R.P.M. or 8-9 miles per hour. Charging current at closing of contacts is 2 amperes. Discharge current at opening of contacts is 0-2.5 amperes. Contact gap is .025-.035 inch. Air gap between the relay armature and coil core is .010-.030 inch with contacts closed.

**LIGHTING:**—Briggs and Stratton Switch Model 40153. Lighting switch is mounted at the base of the steering column. Head lights are 6-8 volt, 21-21 cp. (double filament-double contact) Mazda 1110. Side, dash, tail and toneau lights are 6-8 volt, 3 cp. S.C. Mazda 63. Dome light is 6-8 volt, 6 cp. S.C. Mazda 81. Stop light is 6-8 volt, 15 cp. S.C. Mazda 87.

**FUSES:**—Lighting fuse is mounted on the dash. It is 20 ampere capacity.

# OAKLAND

MODEL 212 ALL AMERICAN SIX, SERIAL NOS. 227000 UP  
PRODUCTION STARTED OCTOBER 1928  
DELCO-REMY GENERATING, STARTING SYSTEM  
DELCO-REMY IGNITION

**BATTERY:**—Willard and U.S.L. Types WSB-15 and XY-15X6, 6 volt, 15 plates. The negative (—) terminal is grounded. Starting capacity (20 minute rate) is 119 amperes for 20 minutes. Lighting capacity (5 ampere rate) is 5 amperes for 20.8 hours. Battery is mounted under the front floor boards on the left hand side.

**IGNITION:**Coil Model 528-C. Distributor Model 640-K. Breaker contacts separate .018-.024 inch with breaker arm on lobe of cam. Resurface contacts with a fine flat contact file or on a medium hard oilstone. Adjust contact gap by loosening lock screw on stationary contact plate and shifting plate by turning eccentric adjusting screw until proper contact is secured. Breaker arm spring tension is 17-21 ounces. Distributor is full automatic. Maximum automatic advance is 21-23 degrees.

**Mounting:**—Coil is mounted on the dash. Distributor is mounted at the left of the engine. To remove distributor, disconnect primary lead and remove head with cables intact. Loosen the mounting screw on side of distributor shaft and lift distributor from place.

**Oiling:**—Fill grease cup on side of distributor with medium cup grease and turn down one turn every 500 miles. Put a small bit of vaseline on the breaker cam every 1000 miles.

**Timing:**—Breaker contacts separate when piston entering power stroke reaches a position 4 degrees (measured on the flywheel) before top dead center. To check timing, crank engine over until piston No. 1 is coming up on the compression stroke. This is the up stroke with both valves closed. Continue to crank engine until piston reaches a position 4 degrees (measured on the flywheel) before top dead center when the mark '1&6' on the flywheel is opposite the indicator. Breaker contacts should separate at this point. If they do not, loosen the clamp screw on side of distributor mounting and rotate distributor until contacts open. Tighten the clamp screw. Make certain that the rotor is opposite the segment connected to the spark plug in cylinder No. 1 and connect the remaining plugs in order around the distributor head.

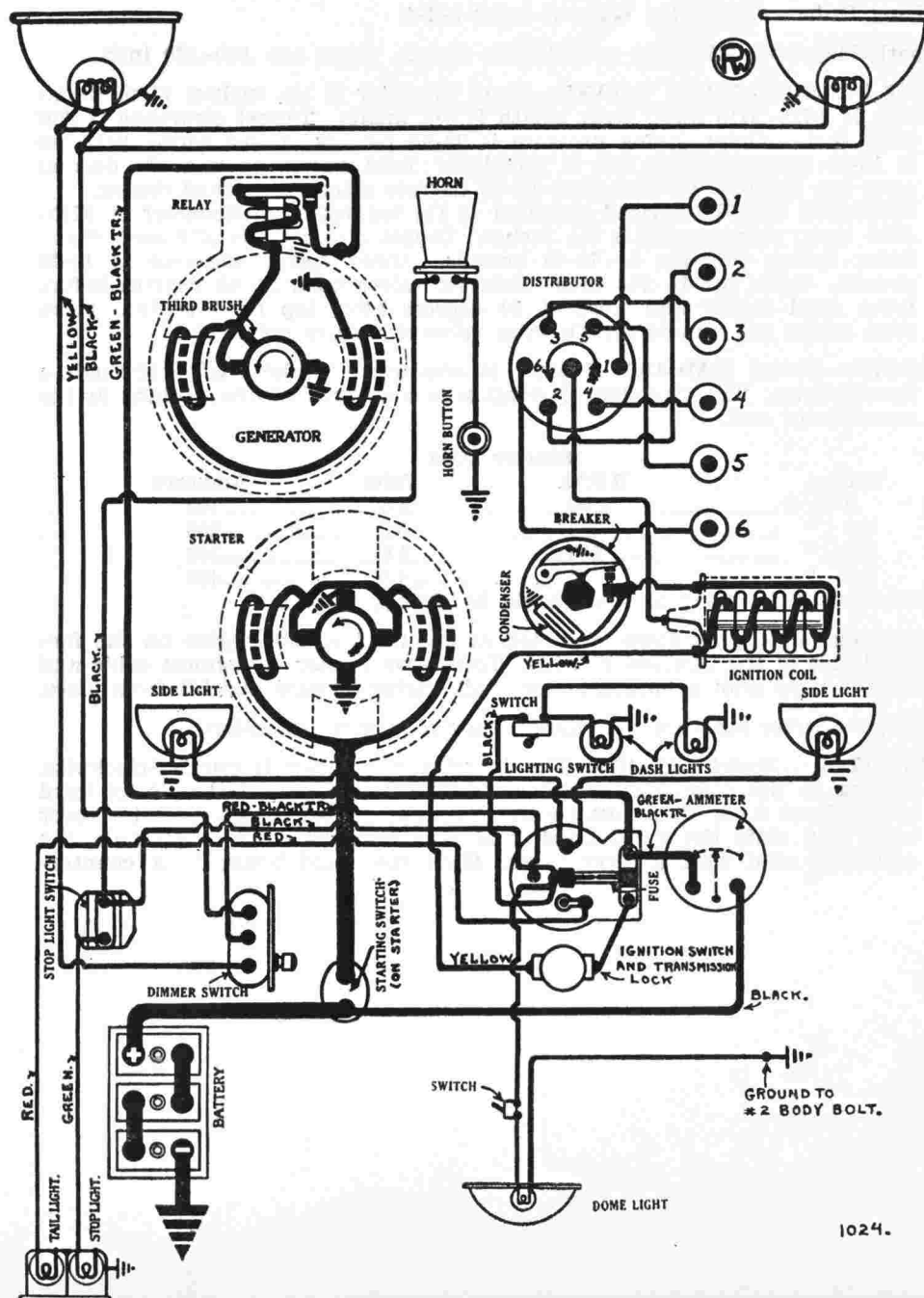
**Firing Order:**—The firing order is 1-5-3-6-2-4. No. 1 cylinder nearest the radiator.

**Spark Plugs:**—Spark plugs are  $\frac{7}{8}$  inch Standard. Gaps are .022 inch.

**VALVE TIMING:**—**INLET VALVES:**—Head diameter is  $1\frac{1}{8}$  inches; stem diameter is  $\frac{5}{16}$  inch; stem length is  $5\frac{1}{16}$  inches. Tappet clearance is .007-.009 inch. Spring pressure is 40-50 pounds. Valve lift is  $\frac{9}{32}$  inch. Inlet valves open at 5 degrees after top dead center and close at 40 degrees after lower dead center.

**EXHAUST VALVES:**—Head diameter is  $1\frac{1}{2}$  inches; stem diameter is  $\frac{5}{16}$  inch; stem length is  $5\frac{1}{16}$  inches. Tappet clearance is .007-.009 inch. Spring pressure is 40-50 pounds. Valve lift is  $\frac{9}{32}$  inch. Exhaust valves open at 45 degrees before lower dead center and close at 5 degrees after top dead center. Valve stem guides are removable. Oversize valves are not made.

**STARTER:**—Model 714-F. Starter is connected to the engine through a Bendix drive. The direction of rotation is counter-clockwise, looking at the commutator end. Starter cranks the engine at 100-175 R.P.M. Brush spring tension is 24-28 ounces.





# OAKLAND

MODEL 212 ALL AMERICAN SIX, SERIAL NOS. 227000 UP  
PRODUCTION STARTED OCTOBER 1928  
DELCO-REMY GENERATING, STARTING SYSTEM  
DELCO-REMY IGNITION

Starter Data			
Torque	R.P.M.	Volts	Amperes
0 lb. ft.	5000	5	65
12 "	Lock	3.63	475

**Mounting:**—Starter is flange mounted at left of engine on forward side of flywheel housing. To remove starter, disconnect cable and remove flange mounting cap screws. Then pull starter forward and lift from place.

**Oiling:**—Put 4 or 5 drops of light oil in the commutator end oiler every 1000 miles. The drive end bearing is oilless. It requires no attention.

**GENERATOR:**—Model 949-N. The direction of rotation is counter-clockwise, looking at the commutator end. Generator current regulation is by third brush shunt field. To adjust generator output, loosen the small round headed screw on the generator end plate and remove the commutator cover band. Then shift the third brush in a counter-clockwise direction to increase the charging rate and in the opposite direction to decrease the charging rate. Tighten the screw after making the adjustment. With standard car setting, charging rate is 14 amperes (hot) or 17 amperes (cold) reached at 1400 R.P.M. or approximately 20 miles per hour.

Generator Data					
Cold Test			Hot Test		
Amperes	Volts	R.P.M.	Amperes	Volts	R.P.M.
15-17	7.95-8.15	1400	11-14	7.55-7.85	1700-1800

Generator, motoring draws 5.5 amperes at 6 volts. Shunt field current is 4-6.1 amperes at 6 volts. Brush spring tension is 16-18 ounces.

**Mounting:**—Generator is mounted at left front of engine by special swinging bracket and is driven by fan belt. To remove generator, disconnect lead and loosen nut on special adjustment bracket and swing generator toward engine block. Slip off belt. Then remove two bolts in bracket under generator and lift generator from place.

**Oiling:**—Put 4 or 5 drops of light engine oil in each of the oilers every 500 miles.

**RELAY:**—Model 265-B. Relay is mounted on the generator. Relay closes at 7-10 miles per hour or 575 R.P.M. when the generator voltage reaches 7-7.5 volts and opens with a discharge current of 0-2.5 amperes. Relay contacts separate .015-.025 inch. Air gap between the relay armature and coil core is .014-.021 inch with contacts closed.

**LIGHTING:**—Clum Lighting Switch. Switch is mounted on the dash. Head lights are 6-8 volt, 21-21 cp. (double filament-double contact) Mazda 1110. Dash, tail and side lights are 6-8 volt, 3 cp. S.C. Mazda 63. Stop light is 6-8 volt, 15 cp. S.C. Mazda 87.

**FUSE:**—Lighting fuse on back of switch is 20 amperes.



# PLYMOUTH

## MODEL Q (1929), SERIAL NO. HL950P

### DELCO-REMY GENERATING, STARTING SYSTEM DELCO-REMY IGNITION

**BATTERY:**—Willard, Type WR-13. 6 volt. The positive (+) terminal is grounded. Starting capacity (20 minute rate) is 98 amperes for 20 minutes. Lighting capacity (5 ampere rate) is 5 amperes for 16.8 hours. Battery is mounted under front floor boards on left frame member.

**IGNITION:**—Coil Model 525-E. Distributor Model 638-B. Breaker contacts separate .018-.024 inch. Resurface contacts with a fine flat contact file or on a medium hard oilstone. To adjust contact opening, loosen lock screw located behind stationary contact and turn eccentric adjusting screw on crescent shaped contact mounting arm until desired breaker gap is obtained. Then tighten lock screw to hold adjustment. Distributor is of the semi-automatic type. Manual advance is 22 degrees (engine). Automatic advance begins at 400 R.P.M. Maximum automatic advance is 18 degrees at 2400 R.P.M. Breaker arm spring tension is 17.5-20.5 ounces. Ignition current is 2 amperes at 6 volts with engine running and 5 amperes at 6 volts with engine stopped.

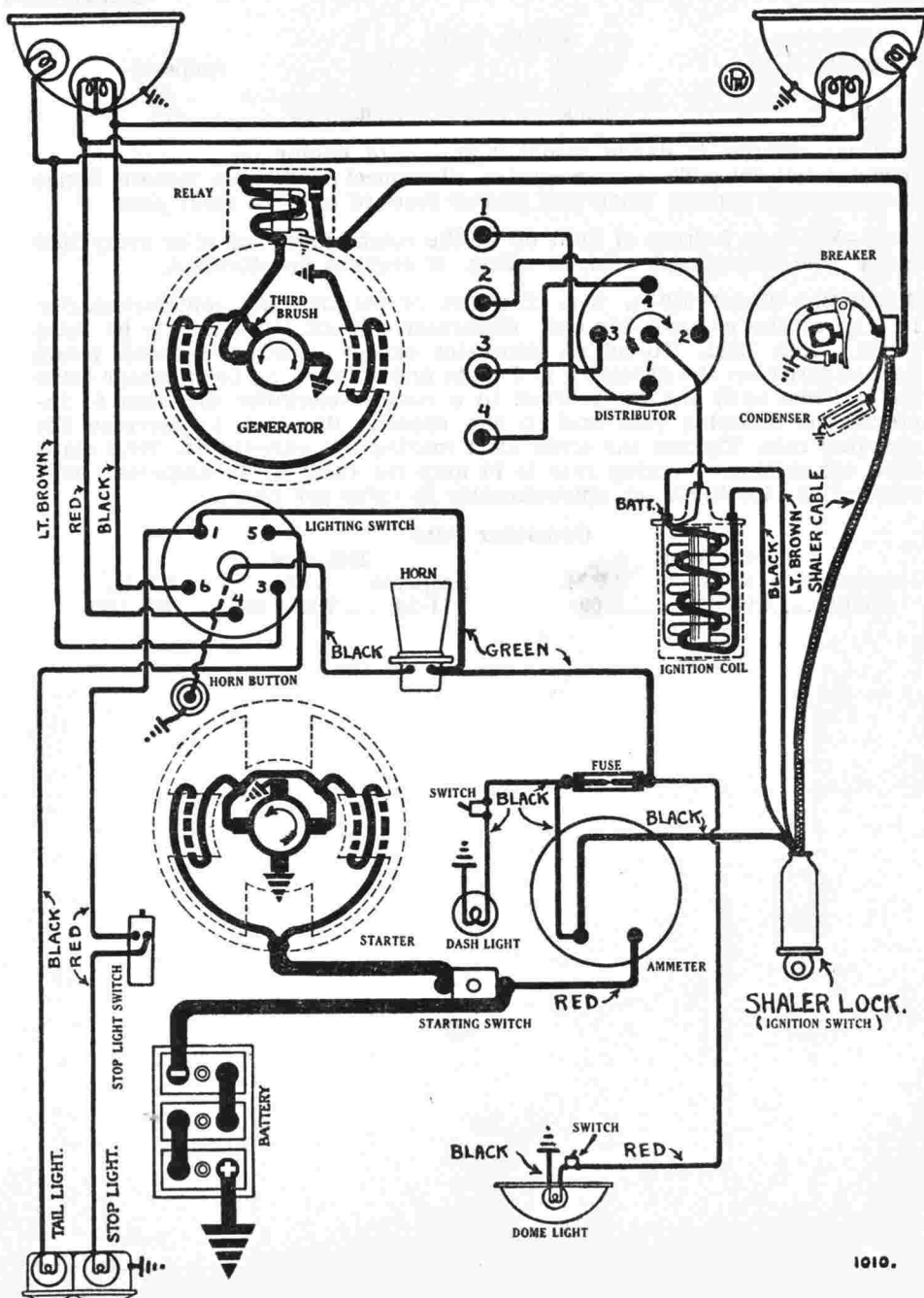
**Mounting:**—Coil is mounted on the dash. Distributor is mounted at front of engine and is accessible from the right side. Drive is by slotted tongue from the forward end of the cam shaft. To remove distributor, disconnect breaker lead and high tension cables or remove distributor head. Then remove two mounting bolts holding distributor bracket and gear case to forward end of engine gear case. Distributor can then be lifted from place.

**Oiling:**—Fill the grease cup on the side of the distributor shaft with medium, cup grease and turn down two turns every month or each 1000 miles. Keep the oiler on the distributor gear compartment filled with light engine oil.

**Timing:**—Remove the spark plug from No. 1 cylinder and insert micrometer gauge. Take a small 6 volt lamp and connect one terminal to the distributor primary terminal and the other side to the battery terminal of the relay. If the relay is not connected to a battery, connect lamp to one terminal of a battery and ground the other terminal of the battery to the engine. When the points are closed the test lamp will burn, but when they are open the circuit is broken and the lamp will go out. Set the distributor at the full manual advance point. Turn the engine over and locate the dead center point, setting the micrometer gauge on zero at the dead center point. Next, turn the engine over, coming up on the compression stroke on No. 1 cylinder and stop with the piston .050 inch before top dead center. See that the distributor rotor is at the No. 1 cable terminal. Loosen the screw which clamps the distributor timing lever to the distributor and rotate the distributor until No. 1 cam begins to open the breaker points, i.e., until the lamp goes out. The clamp screw should then be tightened and the distributor cap and the spark plug wires re-installed. To check ignition timing, turn engine over two or three times, then come up again on No. 1 compression stroke, tapping the crank lightly until the lamp goes out. If the dial gauge reads within the limits of .045 inch to .055 inch on a standard head engine with a ratio of 4.6 to 1 the timing is satisfactory. If outside these limits timing should be reset.

**VALVE TIMING:**—INLET VALVES:—Head diameter, 1 23/32 inches; stem diameter, 3/8 inch; stem length, 4 3/8 inches. Tappet clearance is .005 inch (hot). Spring pressure with valves open is 56 pounds. With valves closed the spring pressure is 40 pounds. Valve lift is 9/32 inch. Inlet valves open 5 degrees past top dead center and close 45 degrees past lower dead center.

EXHAUST VALVES:—Head diameter 1 19/32 inches; stem diameter is 3/8 inch; stem length is 4 3/8 inches. Tappet clearance is .007 (hot). Spring



# PLYMOUTH

## MODEL Q (1929), SERIAL NO. HL950P

### DELCO-REMY GENERATING, STARTING SYSTEM

### DELCO-REMY IGNITION

pressure with valves open is 56 pounds and with valves closed is 40 pounds. Valve lift is 9/32 inch. Inlet valves open at 3 degrees past top dead center and close at 49 degrees before lower dead center. Valve stem guides are removable. Oversize valve stems are not made.

**Firing Order:**—The firing order is 1-3-4-2.

**Spark Plugs:**—Spark plugs are 7/8-18 S.A.E. Gaps are .030 inch.

**STARTER:**—Model 714-J. Starter is connected to the engine through a Bendix drive. The direction of rotation is counter-clockwise, looking at the commutator end. Starter brush tension is 24-28 ounces.

Starter Data			
Torque	R.P.M.	Volts	Amperes
0 lb. ft.	4100	5.6	75
3 "	1500	5	200
6 "	800	4.5	300
9.4 "	350	4	400
12.8 "	Lock	3.5	500

**Mounting:**—Starter is flange mounted at left of engine on forward side of bell housing. To remove starter, disconnect starter cable and remove two flange mounting screws. Then slide starter from place.

**Oiling:**—Put 4 or 5 drops of light engine oil in the oiler on the commutator end of the starter every month or each 1000 miles.

**GENERATOR:**—Model 947-B. The direction of rotation is counter-clockwise, looking at the commutator end. Generator current regulation is by third brush system. To adjust charging rate, remove the commutator cover band and loosen the small round headed screw on the commutator end plate of the generator. Then shift the third brush in a counter-clockwise direction to increase the charging rate and in the opposite direction to decrease the charging rate. Tighten the screw after making the adjustment.

#### Generator Data

Cold Test			Hot Test		
Amperes	Volts	R.P.M.	Amperes	Volts	R.P.M.
0	6.4	800	0	6.4	850
5.6	7	1000	6	7	1250
11.6	7.4	1325	9.4	7.4	1625
15	8	1900	11	7.55	2125
13.2	7.8	2500	10	7.45	2750

Shunt field current is 5 amperes at 6 volts. Generator motoring draws 5.5 amperes at 6 volts. Brush spring tension is 24-28 ounces.

**Mounting:**—Generator is cradle mounted at front end of the engine and is belt driven. The fan is mounted on the forward side of the generator drive belt. To remove generator, disconnect generator lead and loosen the generator cradle stud nut which is the large nut directly under the generator holding the generator cradle bracket in place. Then lower generator and cradle and slip off drive belt. Loosen nut on generator mounting strap and slide generator from place.

**Oiling:**—Put 4 or 5 drops of light engine oil in the oiler on each end of the generator every month or each 1000 miles.

**RELAY:**—Model 265-B. Relay is mounted on top of the generator. Relay closes when the voltage of the generator reaches 7.25 volts and opens with a discharge current of 0-2.5 amperes. Relay contacts separate .020 inch. Air gap between relay armature and coil core is .016 inch with contacts closed.

**LIGHTING:**—Clum Switch. Lighting switch is mounted at the base of the steering column. Head lights are 6-8 volt, 21-21 cp. (double filament-double contact). Dash light is 6-8 volt, 3 cp. D.C. Tail and stop lights are 6-8 volt, 21-2 cp. D.C. Dome light is 6-8 volt, 15 cp. S.C.

**FUSES:**—Lighting fuse on dash is 20 amperes capacity.



# REO

## FLYING CLOUD MODEL C (1929)

### DELCO REMY GENERATING, STARTING SYSTEM DELCO-REMY IGNITION

**BATTERY:**—Willard, Type SJRR-4, 6 volt. The negative (—) terminal is grounded. Starting capacity (20 minute rate) is 125 amperes for 20 minutes. Lighting capacity (5 ampere rate) is 5 amperes for 22 hours.

**IGNITION:**Coil Model 525-E. Ignition current is 1-3 amperes with engine running and 3.4-5 amperes at 6 volts with engine stopped. Ignition coil is mounted on the dash.

**Distributor Model 640-G.** Breaker contacts separate .018-.024 inch. Set contact gap by loosening lock screw on stationary contact mounting plate and turning eccentric adjusting screw until proper clearance is secured with breaker arm on lobe of cam. Resurface contacts with a fine flat contact file or on a medium hard oilstone. Breaker arm spring tension is 17-21 ounces. Distributor is semi-automatic. Maximum manual advance is 25 degrees (engine). Automatic advance begins at 900 R.P.M. of engine. Maximum automatic advance is 20 degrees reached at 3000 R.P.M. of the engine. Ignition switch is Delco-Remy Dual-lock Model 425-C.

**Mounting:**—Ignition coil is mounted on the dash. Distributor is mounted on cylinder head and is driven by spiral gears from the camshaft. To remove distributor, disconnect primary lead and manual advance rod and remove distributor head with high tension cables intact. Then loosen distributor clamp screw and lift distributor from place.

**Oiling:**—Refill the grease cup under the distributor head with medium cup grease and turn down two turns every month or each 1000 miles. Put a small amount of vaseline on the face of the breaker cam under the fiber bumper of the contact arm.

**Timing:**—Breaker contacts begin to separate when the piston entering power stroke reaches a position one inch after top dead center (on the flywheel) with the spark lever and breaker assembly fully retarded. To set timing, crank engine until piston No. 1 reaches top dead center on the compression stroke (the upstroke with both valves closed). Then remove inspection hole cover in top of flywheel case. The flywheel marking 'UDC' will be opposite the indicator line in the edge of the opening. Fully retard spark lever and crank engine over one inch when flywheel mark will be one inch past the indicator. Breaker contacts should separate at this point. If they do not, loosen advance arm clamp screw and rotate until contacts begin to separate. Tighten the clamp screw.

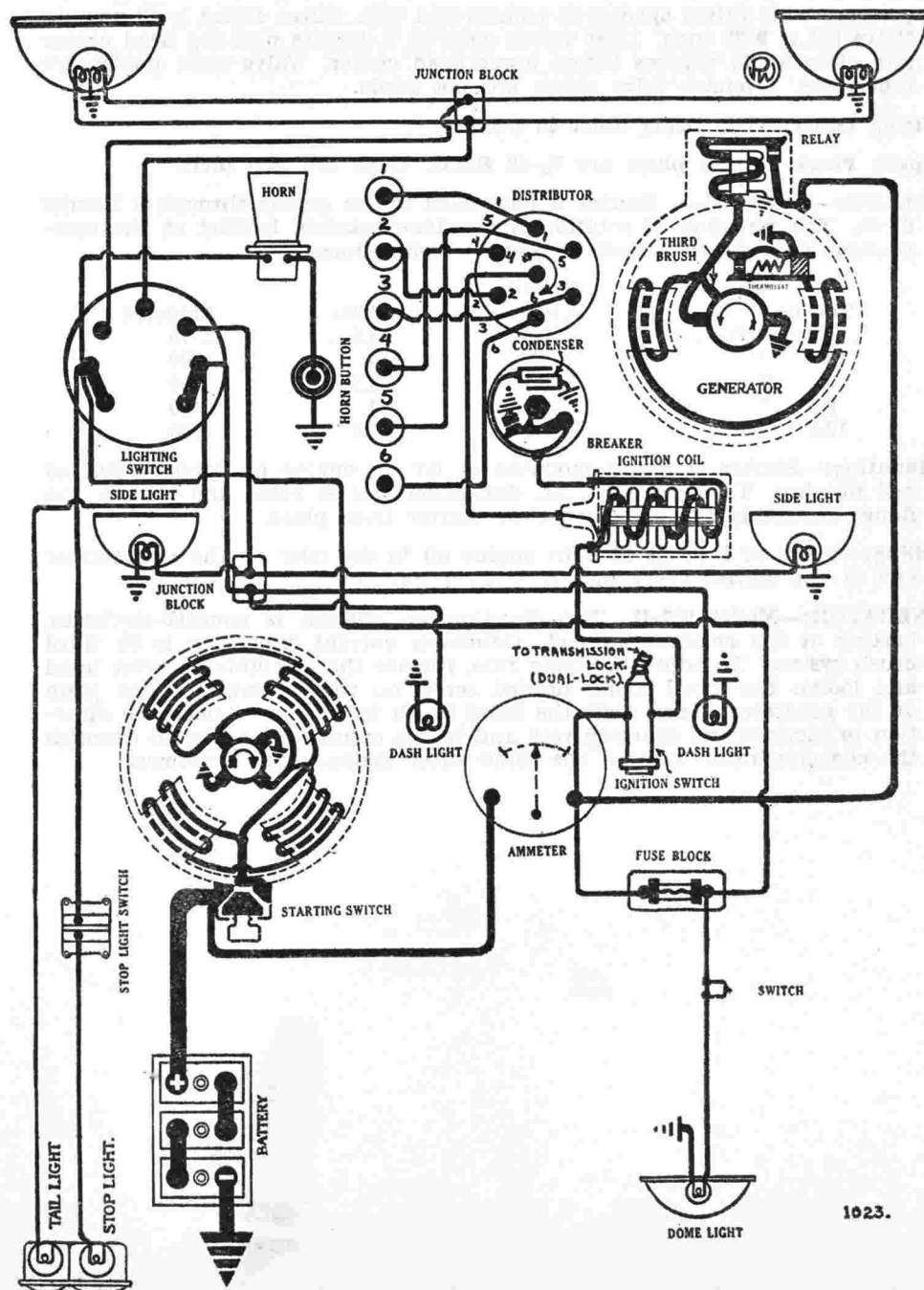
**Firing Order:**—The firing order is 1-5-3-6-2-4.

**Spark Plugs:**—Spark plugs are 7/8-18 S.A.E. Standard. Gaps are .030 inch.

**VALVE TIMING:**—Specifications:—Head diameter, 1 13/16 inches; stem diameter, .3437 inch. Spring pressure, 52 1/2 pounds. Tappet clearance, .004 inch (inlet) and .006 (exhaust).

**Timing:**—Inlet valves open at top dead center and close 40 after lower dead center. Exhaust valves open 48 degrees before lower dead center and close 2 degrees after top dead center. Flywheel is marked 'UDC No. 1 Int. Open' for intake opening of cylinder No. 1.

**STARTER:**—Model 724-M. Starter is connected to the engine through a mechanical pinion shift and an overrunning clutch. The direction of rotation of the armature shaft is clockwise, looking at the commutator end. Brush spring tension is 24-28 ounces each.



Starter Data			
Torque	R.P.M.	Volts	Amperes
0 lb. ft.	3500	5	70
22 "	Lock	3	600

# REO

## FLYING CLOUD MODEL C (1929)

### DELCO REMY GENERATING, STARTING SYSTEM DELCO-REMY IGNITION

**Mounting:**—Starter is mounted at left of engine on forward side of flywheel housing. To remove starter, disconnect cable and remove 3 flange mounting cap screws. Then pull starter forward and lift from place.

**Oiling:**—Put 8 or 10 drops of light engine oil in each of the starter bearing oilers every month or each 1000 miles. Every six months or each 5000 miles, remove the grease plug in the gear case and repack the reduction gears with medium cup grease.

**GENERATOR:**—Model 955-G. The direction of rotation is counter-clockwise, looking at the commutator end. Generator current regulation is by third brush shunt field combined with a thermostat. Thermostat contacts open at 160°F. cutting a resistance in the field circuit and reducing the output approximately 40%. To adjust the generator output, remove the commutator cover band and loosen the small round headed screw on the generator end plate. Then shift the third brush in a counter-clockwise direction to increase the charging rate and in the opposite direction to decrease the charging rate. Tighten the screw after making the adjustment. With standard car setting the maximum charging rate is 18-19 amperes (cold) reached at 1450 R.P.M. or 25-26 M.P.H.

#### Generator Data

Cold Test			Hot Test		
Amperes	Volts	R.P.M.	Amperes	Volts	R.P.M.
19-21.....	8.35-8.5.....	1450	9-12.....	7.35-7.65.....	1800-2000

Motoring freely, generator draws 5 amperes at 6 volts. Shunt field cur-

rent is 4-6.1 amperes at 6 volts. Brush spring tension should be 14-18 ounces.

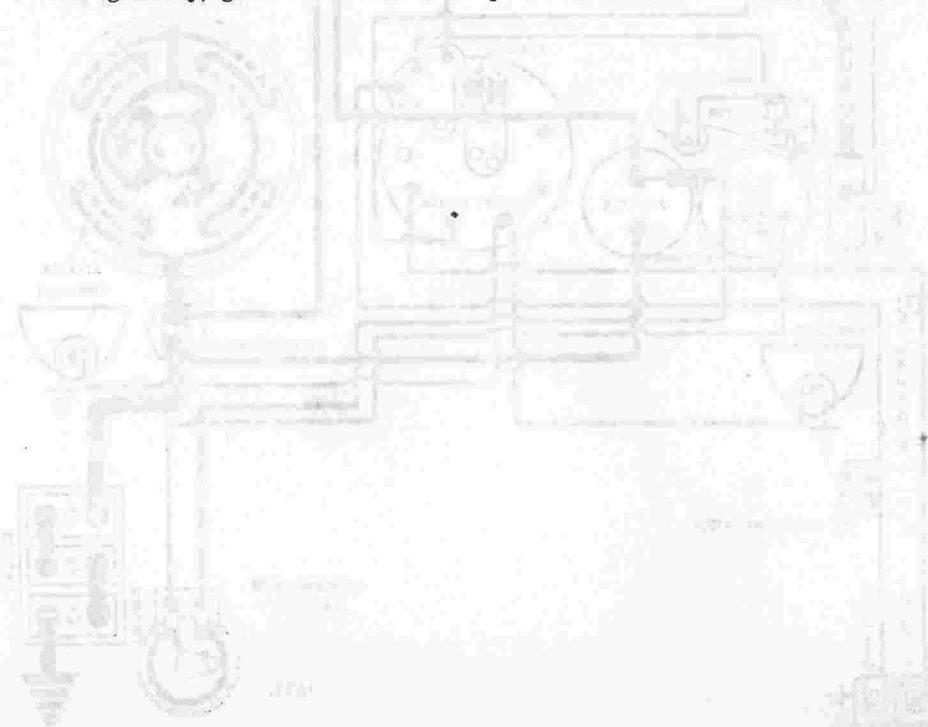
**Mounting:**—Generator is flange mounted at right of engine at rear of timing chain case. To remove generator, disconnect generator lead and remove flange mounting cap screws. Then slide generator to the rear. Generator drive is by slotted tongue from chain sprocket. Adjustment of timing chain is provided by loosening the generator mounting screws and moving the generator sideways. The chain should be loose enough to run noiselessly.

**Oiling:**—Put 8 or 10 drops of light engine oil in each of the generator bearing oilers every month or each 1000 miles.

**RELAY:**—Model 265-B. Relay is mounted on top of the generator. Relay closes when the voltage of the generator reaches 7-7.5 volts and opens with a discharge current of 0-2.5 amperes. Charging current at closing of contacts is 3 amperes. Relay contacts separate .015-.025 inch. Air gap between relay armature and coil core is .014-.021 inch, contacts closed.

**LIGHTING:**—Delco-Remy Switch Model 482-F. Switch is mounted at lower end of steering column. Head lights are 6-8 volt, 21-21 cp. (double filament-double contact base using second 21 cp. filament instead of dimming) Mazda No. 1110. Side lights are 6-8 volt, 3 cp. S.C. Mazda No. 63. Stop light is 6-8 volt, 15 cp. S.C. Mazda No. 87. Dash and tail lights are each 6-8 volt, 3 cp. S.C. Mazda No. 63.

**FUSES:**—Lighting fuse on block mounted on the dash is 20 amperes.



# STEARNS KNIGHT

## MODELS M AND N 6-80 (1929)

### AUTO-LITE GENERATING, STARTING SYSTEM

### AUTO-LITE IGNITION

**BATTERY:**—U.S.L., Type 3-HVX-8X4, 6 volt. The negative (—) terminal is grounded. Starting capacity (20 minute rate) is 170 amperes for 20 minutes. Lighting capacity (5 ampere rate) is 5 amperes for 33.2 hours. The battery is mounted under the front floor boards on the right frame member.

**IGNITION:**—Coil Model IG-4065. Coil is mounted on the right side of the crank case. Ignition current is 2 amperes at 6 volts with engine running and 4 amperes at 6 volts with engine stopped.

**Distributor Model IGA-4035.** Breaker contacts separate .020-.022 inch with breaker arm on lobe of cam. Resurface contacts with a fine flat contact file or on a medium hard oilstone. Breaker arm spring tension is 20 ounces. Distributor is semi-automatic. Manual advance is 10 degrees (distributor). Maximum automatic advance is 10 degrees (distributor).

**Mounting:**—Distributor is bolted to flange on generator drive bracket. To remove distributor, disconnect primary lead and manual advance rod. Remove head with high tension cables intact. Remove mounting bolts and lift distributor from position.

**Oiling:**—Fill the grease cup on the side of the distributor with pure vaseline and turn down one turn every two weeks or each 500 miles. Every 5000 miles put a small bit of vaseline on the face of the breaker cam.

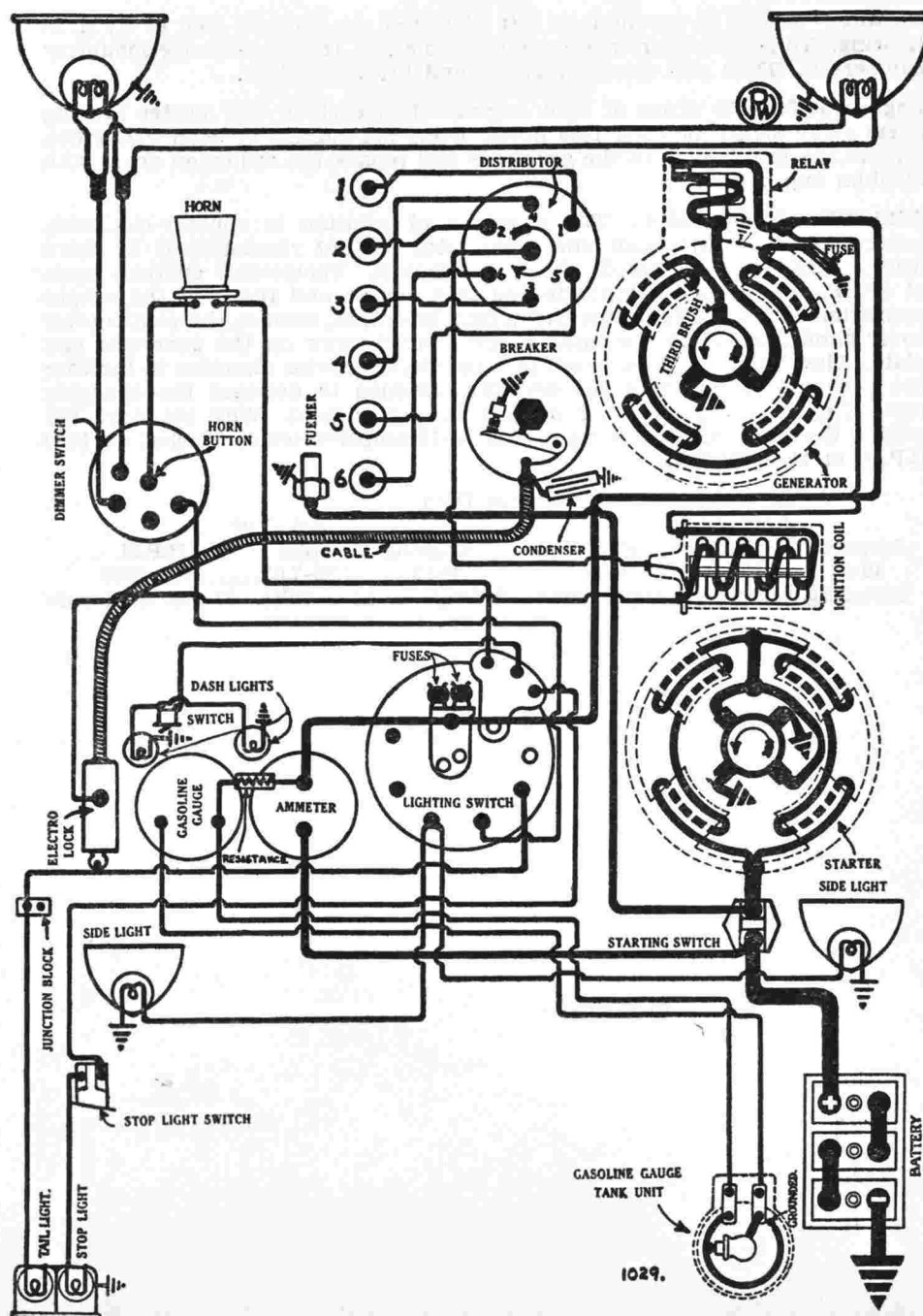
**Timing:**—Breaker contacts separate when the piston reaches a position 12 degrees before top dead center with the manual spark control lever fully advanced. To check timing, crank engine over until piston No. 1 is coming up on the compression stroke. This is the up stroke with both valves closed. Fully advance the spark. Continue to crank engine until piston reaches a position 12 degrees before top dead center mark on the flywheel. Breaker contacts should separate at this point. If they do not, loosen the clamp screw and rotate the distributor until contacts open. Tighten the clamp screw and make certain that the rotor is opposite the segment connected to the spark plug in cylinder No. 1 and connect the remaining plugs in order 5-3-6-2-4 around the distributor head.

**Firing Order:**—The firing order is 1-5-3-6-2-4.

**Spark Plugs:**—Spark plugs are  $\frac{7}{8}$  inch Standard. Gaps are .028 inch.

**VALVE TIMING:**—The Stearn Knight engine is of the sleeve valve type. The inlet port opens 10 degrees after top dead center and closes 35 degrees after lower dead center. The exhaust port opens at 50 degrees before lower dead center and close 5 degrees after top dead center. To adjust the port openings, crank engine over until piston No. 1 reaches a position 5 degrees after top dead center. Then turn eccentric shaft until the exhaust port in cylinder No. 1 has just closed. At this point the upper edge of the port in the outer sleeve will just pass the lower edge of the cylinder port with the outer sleeve moving downward. Then assemble timing chain, being careful not to disturb the relative position of the eccentric shaft and crankshaft.

**STARTER:**—Model MAB-4001. Starter is connected to the engine through a Bendix drive. The direction of rotation is counter-clockwise, looking at the commutator end. Brush spring tension is  $1\frac{3}{4}$ -2 $\frac{1}{4}$  pounds each. Starter cranks the engine at 120 R.P.M.





# STEARNS KNIGHT

## MODELS M AND N 6-80 (1929)

### AUTO-LITE GENERATING, STARTING SYSTEM AUTO-LITE IGNITION

Starter Data			
Torque	R.P.M.	Volts	Amperes
.6 lb. ft.....	1900.....		100
3.5 ".....	1100.....		200
6.6 ".....	700.....		300
10.2 ".....	410.....		400
24 ".....	Lock.....	4.....	725

**Mounting:**—Starter is sleeve mounted at the right of the engine on the forward side of the flywheel housing. To remove starter, disconnect cable and remove large pilot screw from housing directly above starter sleeve. Then pull starter forward and lift from place.

**Oiling:**—Starter bearings are oilless. They require no attention.

**GENERATOR:**—Model GRE-4207. The direction of rotation is counter-clockwise, looking at the commutator end. Generator current regulation is by third brush shunt field. To adjust generator output, remove commutator cover band and shift third brush and mounting bracket by tapping third brush mounting stud with a screwdriver. Shift the third brush in a counter-clockwise direction to increase the charging rate and in the opposite direction to decrease the charging rate. The mounting plate is held in any position by friction between the mounting stud and the end plate. With standard car setting, the maximum charging rate is 16 amperes (cold) at 6 volts.

Generator Data					
Cold Test			Hot Test		
Amperes	Volts	R.P.M.	Amperes	Volts	R.P.M.
0.....	6.....	400	0.....	8.....	400
18.....	8.....	1200	14.....	8.....	1200

Brush spring tension is 20-24 ounces. Generator motoring draws 5.25 amperes at 6 volts. Shunt field current is 4.41 amperes at 6 volts.

**Mounting:**—Generator is cradle mounted at right of engine. To remove generator, disconnect lead and remove clamp band. Then pull generator to rear to disengage coupling and lift from place.

**Oiling:**—Put 8 or 10 drops of light engine oil in each of the generator oilers every 1000 miles.

**RELAY:**Model CB-4009. Relay is mounted on the generator. Relay contacts close when the voltage of the generator reaches 7.5 volts at 600 R.P.M. or 8 miles per hour. Charging current at closing of contacts is 5 amperes. Contacts open with a discharge current of .5-2.5 amperes. Contact gap is .025-.035 inch. Air gap between the relay armature and coil core is .015 inch with contacts closed.

**LIGHTING:**—Briggs and Stratton Switch Model 40701. Lighting switch is mounted at the base of the steering column. Head lights are 6-8 volt, 21-21 cp. (double filament-double contact) Mazda 1110. Side, dash, tail, dome and corner lights are 6-8 volt, 3 cp. S.C. Mazda 63. Stop light is 21 cp. S.C. Mazda 1129.

**FUSES:**—Lighting fuses are mounted on the dash. They are 20 ampere capacity.

# STEARNS KNIGHT

## MODELS H AND J 8-90 (1929)

### DE JON GENERATING, STARTING SYSTEM AUTO-LITE IGNITION

**BATTERY:**—U. S. L., Type 3-CVX-10X, 6 volt. The negative (—) terminal is grounded. Starting capacity (20 minute rate) is 192 amperes for 20 minutes. Lighting capacity (5 ampere rate) is 5 amperes for 38.4 hours. The battery is mounted under the front floor boards on the right frame member.

**IGNITION:**—Coil Model CA-4023. Coil is mounted on the right side of the crank case. Ignition current is 2 amperes at 6 volts with engine running and 4 amperes at 6 volts with engine stopped.

**Distributor Model IAA-4002.** Breaker contacts separate .020-.022 inch with breaker arm on lobe of cam. Resurface contacts with a fine flat contact file or on a medium hard oilstone. Breaker arm spring tension is 20 ounces. Distributor is semi-automatic. Manual advance is 15 degrees (distributor). Automatic advance begins at 500 R.P.M. of engine. Maximum automatic advance is 15 degrees (distributor) reached at 2000 R.P.M.

**Mounting:**—Distributor is mounted in bushing in crank case. To remove distributor, disconnect primary lead and manual advance rod. Remove head with high tension cables intact. Remove set screw and lift distributor from place.

**Oiling:**—Put 4 or 5 drops of light engine oil in the oiler on the side of the distributor housing every two weeks or each 500 miles. Every month put a small bit of vaseline on the face of the breaker cam.

**Timing:**—Breaker contacts separate when the piston entering power stroke reaches a position 8 degrees or 1 inch (measured on the flywheel) before top dead center with the spark control lever in the fully advanced position. To set timing, crank engine over until piston No. 1 is coming up on the compression stroke. This is the up stroke with both valves closed. See that the spark is fully advanced. Continue to crank engine until piston reaches a position 8 degrees before top dead center when the dead center mark on the flywheel will be 1 inch before the indicator in the clutch inspection hole. If breaker contacts are not separating at this point, loosen the taper screw in center of cam and rotate cam until contacts begin to open. Tighten the screw and make certain that the rotor is opposite the segment connected to the spark plug in cylinder No. 1 and connect the remaining plugs in order around the distributor head.

**Firing Order:**—The firing order is 1-6-2-5-8-3-7-4. No. 1 cylinder is nearest the radiator.

**Spark Plugs:**—Spark plugs are  $\frac{7}{8}$  inch Standard. Gaps are .028 inch.

**VALVE TIMING:**—INLET PORTS:—Inlet ports open 6 degrees after top dead center and close 48 degrees after lower dead center.

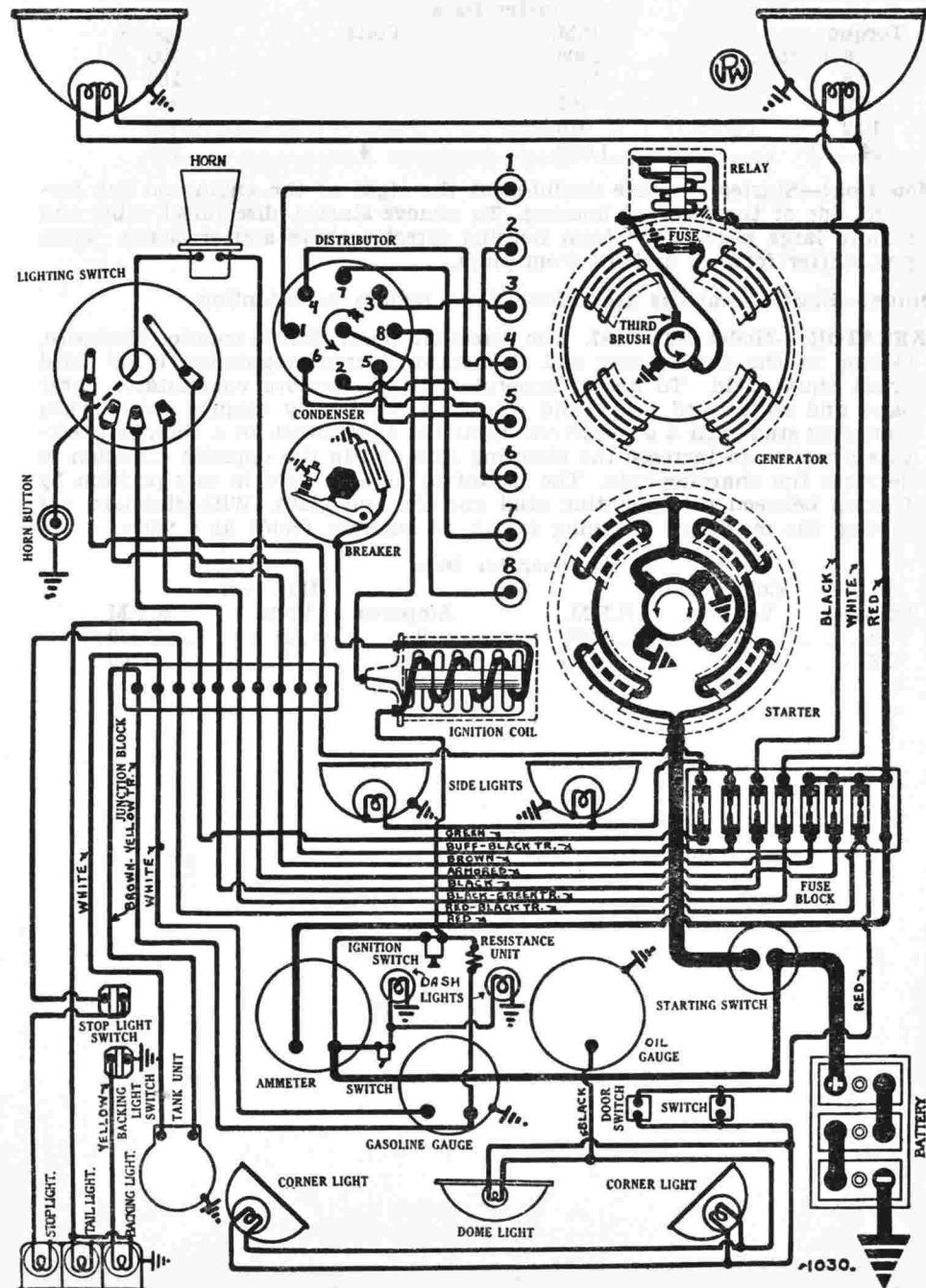
EXHAUST PORTS:—Exhaust ports open 42 degrees before lower dead center and close at top dead center.

**STARTER:**—Model SD-4102. Starter is connected to the engine through an in-board Bendix drive. The direction of rotation is counter-clockwise, looking at the commutator end. Starter cranks the engine at 120 R.P.M. Brush spring tension is 2-3 pounds. Switch is Model 4001.

#### Starter Data

Torque	R.P.M.	Volts	Amperes
0 lb. ft.	Free	6	75
24.4 "	Lock	3	620

**Mounting:**—Starter is sleeve mounted at the right of the engine on the forward side of the flywheel housing. To remove starter, first remove toeboard



# STEARNS KNIGHT

MODELS H AND J 8-90 (1929)  
DE JON GENERATING, STARTING SYSTEM  
AUTO-LITE IGNITION

and remove black enameled cap at rear of flywheel housing in transmission case flange. This exposes Bendix drive. Remove Bendix drive. Then remove set screw in flywheel case directly above starter sleeve and disconnect starter cable. Pull starter forward and lift from position.

**Oiling:**—Starter bearings are oilless. They require no attention.

**GENERATOR:**—Model DJ-4102. The direction of rotation is counter-clockwise, looking at the commutator end. Generator current regulation is by third brush shunt field. To adjust charging rate, insert a screwdriver in the slotted end of the third brush shifting shaft on the commutator end plate and turn the shaft in a counter-clockwise direction to increase the charging rate and in the opposite direction to decrease the charging rate. With maximum setting, generator output is 14 amperes at 6 volts, reached at 1400 R.P.M. or 25 miles per hour.

Cold Test		Generator Data		Hot Test	
Amperes	R.P.M.	Amperes	R.P.M.	Amperes	R.P.M.
0 .....	480	0 .....	500		
1 .....	500	2 .....	600		
5.5 .....	600	7 .....	800		
11 .....	800	10 .....	1000		
15 .....	1200	9 .....	2400		
12 .....	2400	7 .....	3200		
10 .....	3200				

Generator, motoring draws 5.25 amperes at 6 volts. Shunt field current is 4.41 amperes at 6 volts. Brush spring tension is 1½-2 pounds. A five ampere field fuse is mounted on the end plate.

**Mounting:**—Generator is base mounted at right of engine. To remove generator, disconnect lead and remove two bolts from drive coupling. Then remove four base mounting screws and lift generator from place.

**Oiling:**—Put 4 or 5 drops of light engine oil in the generator oilers every two weeks or each 500 miles.

**RELAY:**Model RA-4001-A. Relay is mounted on the generator. Relay closes at 11 miles per hour or 550 R.P.M. when the generator voltage reaches 7-7.5 volts and opens with a discharge current of .5-2.5 amperes. Relay contacts separate .025-.035 inch. Air gap between the relay armature and coil core is .015 inch with contacts closed.

**LIGHTING:**—Briggs and Stratton Switch Model 40701. Head lights are 6-8 volt, 21-21 cp. (double filament-double contact) Mazda 1110. Side, dash, tail and corner lights are 6-8 volt, 3 cp. S.C. Mazda 63. Stop and backing lights are 6-8 volt, 21 cp. S.C. Mazda 1129. Dome light is 6-8 volt, 6 cp. S.C. Mazda 81. Lighting switch is mounted at the base of the steering column and is controlled by lever on steering wheel.

**FUSES:**—Generator field fuse is 5 amperes. Lighting fuses are 20 amperes.



# STUDEBAKER

## "DICTATOR" MODEL GE

PRODUCTION STARTED AUGUST, 1928  
DELCO-REMY GENERATING, STARTING SYSTEM  
DELCO-REMY IGNITION

**BATTERY:**—Willard, Type SJWR-3. 6 volt, 11 plates. The positive (+) terminal is grounded. Starting capacity (20 ampere rate) is 104 amperes for 20 minutes. Lighting capacity (5 ampere rate) is 5 amperes for 18 hours. Battery is mounted under the floor boards on the right frame member.

**IGNITION:**—Coil Model 525-E. Ignition coil is mounted on the dash. Ignition current is  $\frac{1}{2}$ -2 amperes at 6 volts with engine running, and 4 amperes at 6 volts with engine stopped.

**Distributor Model 636-Y.** Breaker contacts separate .020 inch with contact arm on lobe of cam. Adjust contact opening by loosening lock nut on stationary contact stud and turning stud. Resurface contacts with a fine flat contact file or on a medium hard oilstone. Breaker arm spring tension should be 18-21 ounces. Distributor is semi-automatic. Maximum manual advance is 15 degrees (engine). Automatic advance begins at 400 R.P.M. of the engine. Maximum automatic advance is 32 degrees reached at 3000 R.P.M.

**Mounting:**—Distributor is mounted on accessory bracket at right of engine. To remove distributor, disconnect manual advance rod and primary lead and remove head with high tension cables intact. Then loosen advance arm clamp screw and lift distributor from place.

**Oiling:**—Fill the grease cup on the side of the distributor housing and turn down one turn every 2500 miles or once a month. Every six weeks remove distributor head and rotor and put 3 or 4 drops of light oil in the wick oiler.

**Timing:**—Breaker contacts separate when the piston entering power stroke reaches a position  $7\frac{1}{2}$  degrees after top dead center with the manual spark advance fully retarded. To set timing, crank engine until piston No. 1 reaches top dead center on compression stroke. At this point the flywheel mark "UP-DC-1-6" will be opposite the indicator. Then advance spark lever exactly one half. Breaker contacts should begin to separate. If they do not, loosen advance arm clamp screw and rotate distributor housing until contacts begin to separate. Tighten the clamp screw. Make certain that segment directly opposite rotor is connected to spark plug in cylinder No. 1 and connect remaining plugs in order 4-2-6-3-5 counter-clockwise around the distributor.

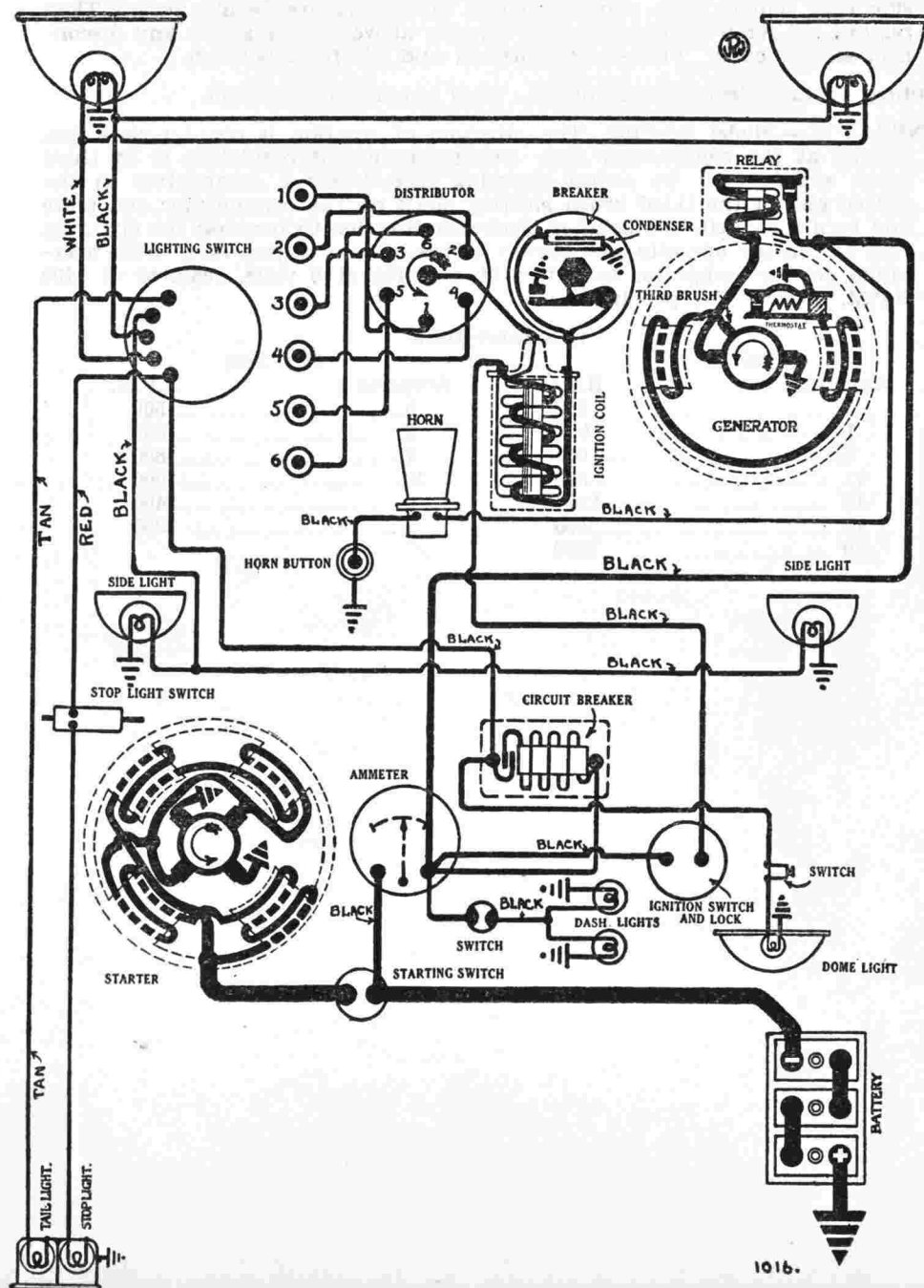
**VALVE TIMING:**—**INLET VALVES:**—Head diameter,  $1\frac{5}{8}$  inches; stem diameter,  $\frac{5}{16}$  inch; stem length,  $5\frac{3}{8}$  inches. Tappet clearance, .006 inch (cold). Spring pressure is 50 pounds. Valve lift is  $\frac{5}{16}$  inch. Inlet valves open 5 degrees after top dead center and close 53 degrees after lower dead center. Flywheel is marked "IN-OP-1-6" at point of inlet opening.

**EXHAUST VALVES:**—Head diameter,  $1\frac{1}{2}$  inches; stem diameter,  $\frac{5}{16}$  inch; stem length,  $5\frac{3}{8}$  inches. Tappet clearance is .008 inch (cold). Spring pressure is 50 pounds. Valve lift is  $\frac{5}{16}$  inch. Exhaust valves open 38 degrees before lower dead center and close 10 degrees after top dead center. Valve stem guides are removable. Oversize valve stems are not made.

**Firing Order:**—The firing order is 1-4-2-6-3-5.

**Spark Plugs:**—Spark plugs are  $\frac{7}{8}$ -18 S.A.E. Standard. Gaps are .025 inch.

**STARTER:**—Model 720-N. Starter is connected to the engine through an out-board Bendix drive. The direction of rotation is counter-clockwise, looking at the commutator end. Starter cranks the engine at 100 R.P.M. drawing 275 amperes at 4.65 volts. Brush spring tension is 24-28 ounces.



# STUDEBAKER

## "DICTATOR" MODEL GE

### PRODUCTION STARTED AUGUST, 1928

### DELCO-REMY GENERATING, STARTING SYSTEM

### DELCO-REMY IGNITION

Starter Data			
Torque	R.P.M.	Volts	Amperes
0 lb. ft.....	6000.....	5 .....	65
4 " .....	1280.....	4.6 .....	210
15 " .....	Lock.....	3.15.....	570

**Mounting:**—Starter is flange mounted at left of engine on forward side of flywheel housing. To remove starter, disconnect cable and remove 3 flange mounting cap screws. Then pull starter forward and lift from place.

**Oiling:**—Put 4 or 5 drops of light oil in the oiler on the commutator end of the starter every 2500 miles or once a month. The drive end bearing is oilless.

**GENERATOR:**—Model 949-J. The direction of rotation is counter-clockwise, looking at the commutator end. Generator current regulation is by third brush shunt field and thermostat. Thermostat contacts open at 165 degrees F. putting the resistance across the contacts in series with the field and reducing the output approximately 40%. To adjust generator output, loosen the small round headed screw on the generator end plate and remove the commutator cover band. Then shift the third brush in a counter-clockwise direction to increase the charging rate and in the opposite direction to decrease the charging rate. Tighten the screw after making the adjustment. With standard car setting, maximum charging rate is 12 amperes at 7.6 volts reached at 2150 R.P.M.

Generator Data		
Hot Test		
Amperes	Volts	R.P.M.
0.....	6.4.....	710
7.....	7.1.....	1120
10.....	7.4.....	1500
12.....	7.6.....	2150
10.....	7.4.....	2800

Running as a motor, generator draws 5.5 amperes at 6 volts. Shunt field current is 5 amperes at 6 volts. Brush spring tension is 18 ounces.

**Mounting:**—Generator is flange mounted on rear of accessory bracket at right of engine. To remove generator, disconnect lead and remove 3 flange mounting cap screws. Then pull generator to the rear.

**Oiling:**—Put 4 or 5 drops of light oil in the oilers at each end of the generator every 2500 miles or once a month.

**RELAY:**—Model 265-B. Relay is mounted on the side of the generator. Relay closes at 710 R.P.M. when the generator voltage reaches 6.8 volts, and opens with a discharge current of 1 ampere. Relay contacts separate .015-.025 inch. Air gap is .014 inch with contacts closed.

**LIGHTING:**—Delco-Remy Switch, Model 484-D. Switch is mounted at base of steering column. Head lights are 6-8 volt, 21-21 cp. (double filament-double contact base). Mazda No. 1110. Side, dash and tail lights are 6-8 volt, 3 cp. S.C. Mazda No. 63. Stop and dome lights are 6-8 volt, 6 cp. S.C. Mazda No. 81.

**CIRCUIT BREAKER:**—Model 410-C. A vibrating circuit breaker protects the lighting circuits. The circuit breaker begins to vibrate with a current of 25-30 amperes. While vibrating the current is 15 amperes.

# STUDEBAKER

## "COMMANDER" MODEL GH

### PRODUCTION STARTED AUGUST, 1928

### DELCO-REMY GENERATING, STARTING SYSTEM

### DELCO-REMY IGNITION

**BATTERY:**—Willard, Type SJWR-4. 6 volt, 13 plates. The positive (+) terminal is grounded. Starting capacity (20 minute rate) is 125 amperes for 20 minutes. Lighting capacity (5 ampere rate) is 5 amperes for 22 hours. Battery is mounted under the front floor boards on the right frame member.

**IGNITION:**—Coil Model 525-E. Coil is mounted on the dash. Ignition current is  $\frac{1}{4}$  to  $2\frac{1}{2}$  amperes at 6 volts with engine running and 4 amperes at 6 volts with engine stopped.

**Distributor Model 636-X.** Breaker contacts separate .020 inch. Adjust contact opening by loosening lock nut on stationary contact stud and turning contact stud. Resurface contacts with a fine flat contact file or on a medium hard oilstone. Breaker arm spring tension is 18-21 ounces. Distributor is semi-automatic. Maximum manual advance is 15 degrees (engine). Automatic advance begins at 550 R.P.M. of engine. Maximum automatic advance is 25 degrees reached at 2400 R.P.M.

**Mounting:**—Distributor is mounted on special bracket at front of engine. To remove distributor, disconnect manual advance rod and primary lead and remove head with high tension cables intact. Then loosen advance arm clamp screw and lift distributor from place.

**Oiling:**—Fill the grease cup on the side of the distributor with medium cup grease and turn down one turn every 2500 miles or once a month. Every six weeks remove the distributor head and rotor and put 4 or 5 drops of light oil in the wick oiler.

**Timing:**—Breaker contacts begin to separate when the piston entering power stroke reaches a position  $7\frac{1}{2}$  degrees after top dead center on the flywheel with the manual spark fully retarded. To set timing, crank engine until piston No. 1 enters compression stroke (the upstroke with both valves closed). Continue to crank engine until piston reaches top dead center when the mark "UP-DC-1-6" on the flywheel will be directly under the pointer in the flywheel case. Advance spark lever exactly one half. If breaker contacts do not separate at this point, loosen advance arm clamp screw and rotate distributor until contacts begin to separate. Tighten the clamp screw and make certain that the segment opposite the rotor button is connected to the spark plug in cylinder No. 1. Connect the remaining plugs in the order 5-3-6-2-4 counter-clockwise around the distributor head.

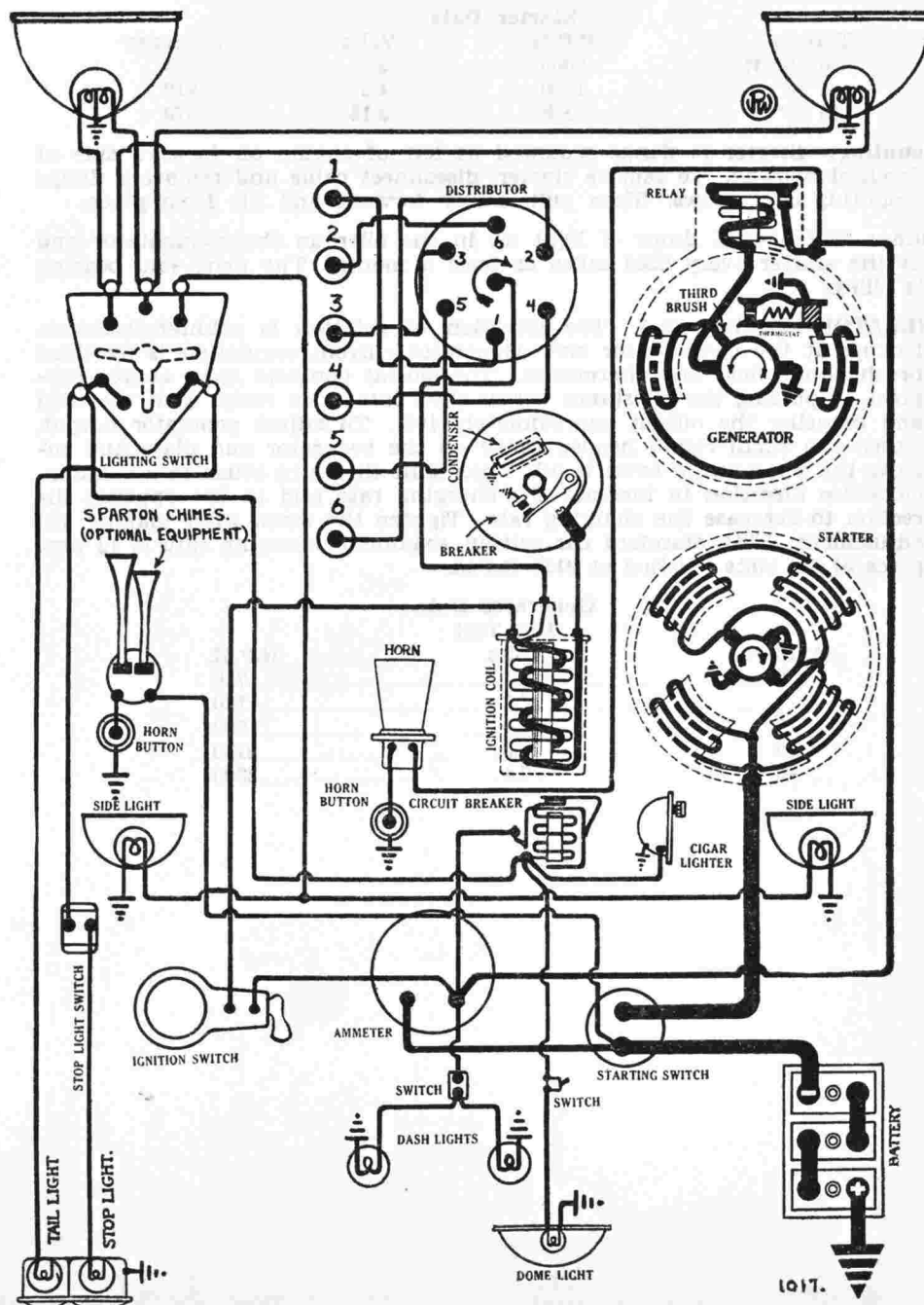
**Firing Order:**—The firing order is 1-5-3-6-2-4.

**Spark Plugs:**—Spark plugs are  $\frac{7}{8}$ -18 S.A.E. Standard. Gaps are .025 inch.

**VALVE TIMING:**—INLET VALVES:—Head diameter,  $1\frac{1}{8}$  inches; stem diameter,  $\frac{3}{8}$  inch; stem length,  $6\frac{9}{16}$  inches. Tappet clearance, .007 inch (cold). Spring pressure, 55-60 pounds. Valve lift,  $\frac{5}{16}$  inch. Intake opens at top dead center and closes at 48 degrees after lower dead center. Inlet opening of cylinder No. 1 is marked on flywheel by mark "IN-OP-1-6".

**EXHAUST VALVES:**—Head diameter,  $1\frac{1}{8}$  inches; stem diameter,  $\frac{3}{8}$  inch; stem length,  $6\frac{9}{16}$  inches. Tappet clearance, .009 inch (cold). Spring pressure, 55-60 pounds. Valve lift,  $\frac{5}{16}$  inch. Exhaust opens at 38 degrees before lower dead center and closes 10 degrees after top dead center. Valve stem guides are removable. Oversize valve stems are not made.

**STARTER:**—Model 723-B. Starter is connected to the engine through a special chain and sprocket drive and overrunning clutch. The direction of rotation is clockwise (armature), looking at the commutator end. Starter





# STUDEBAKER

## "COMMANDER" MODEL GH

### PRODUCTION STARTED AUGUST, 1928

### DELCO-REMY GENERATING; STARTING SYSTEM

### DELCO-REMY IGNITION

cranks the engine at 100 R.P.M. drawing 125 amperes at 5.3 volts. Brush spring tension is 24-28 ounces.

Starter Data			
Torque	R.P.M.	Volts	Amperes
0 lb. ft.	1000	5	70
5 "	500	5.3	125
72 "	Lock	3.2	570

**Mounting:**—Starter is mounted by special bracket at forward end of engine on right side and drives through chain to forward end of crankshaft. To remove starter, drain and remove radiator. Then remove starter clutch and drive chain. Remove bracket bolt and withdraw pin in hinge. Lift starter from place.

**Oiling:**—Put 4 or 5 drops of light oil in each of the starter oilers every 2500 miles or once a month. Every 3 months oil starter clutch through hole in case. Once each year remove plug in reduction gear case and repack gears with graphite grease.

**GENERATOR:**—Model 941-L. The direction of rotation is counter-clockwise, looking at the commutator end. Generator current regulation is by third brush shunt field and thermostat. Thermostat contacts open at 165 degrees F. putting the resistance across the contacts in series with the field and cutting down the output approximately 40%. To adjust generator output, loosen the small round headed screw on the end plate and remove the commutator cover band. Then shift the third brush in a counter-clockwise direction to increase the charging rate and in the opposite direction to decrease the charging rate. Tighten the screw after making the adjustment. With standard car setting, maximum charging rate is 10.5 amperes at 7.5 volts reached at 1450 R.P.M. (hot).

#### Generator Data Hot Test

Amperes	Volts	R.P.M.
0	6.4	750
7	7.1	1200
10	7.45	2000
10.5	7.5	2100
10	7.45	2500

Motoring, generator draws 5.5 amperes at 6 volts. Shunt field current is 5 amperes at 6 volts. Brush spring tension is 18 ounces.

**Mounting:**—Generator is flange mounted in a vertical position at the front of the engine and can be removed from the right side. To remove generator, disconnect lead and remove 3 flange mounting cap screws. Then lift generator straight up to disengage coupling.

**Oiling:**—Put 4 or 5 drops of light oil in each of the generator oilers every 2500 miles or once a month.

**RELAY:**—Model 265-B. Relay is mounted on the side of the generator. Relay closes at 550 R.P.M. or 7-9 M.P.H. when the generator voltage reaches 6.4 volts and opens with a discharge current of 1 ampere. Charging current at closing of contacts is approximately 2 amperes. Relay contacts separate .015-.025 inch. Air gap is .014 inch with contacts closed.

**LIGHTING:**—Delco-Remy Switch, Model 484-D. Switch is mounted at lower end of steering column. The Tilt Ray headlight system is used. Head lights are each 6-8 volt, 21-21 cp (double filament-double contact). Mazda No. 1110. Side, dash and tail lights are each 6-8 volt, 3 cp. S.C. Mazda No. 63. Stop and dome lights are each 6-8 volt, 6 cp. S.C. Mazda No. 81.

**CIRCUIT BREAKER:**—Model 410-C. A vibrating circuit breaker protects the lighting circuits. Circuit breaker begins to operate when current reaches 25-30 amperes and limits the current to 15 amperes while vibrating.

# STUDEBAKER

## "PRESIDENT"

PRODUCTION STARTED AUGUST, 1928  
DELCO-REMY GENERATING, STARTING SYSTEM  
DELCO-REMY IGNITION

**BATTERY:**—Willard, Type SJWR-4. 6 volt, 13 plates. The positive (+) terminal is grounded. Starting capacity (20 minute rate) is 125 amperes for 20 minutes. Lighting capacity (5 ampere rate) is 5 amperes for 22 hours. Battery is mounted under front floor boards on right frame member.

**IGNITION:**—Coil Model 525-E. Coil is mounted on the dash. Ignition current is  $\frac{1}{2}$ -2 amperes at 6 volts with engine running and 4-5 amperes at 6 volts with engine stopped.

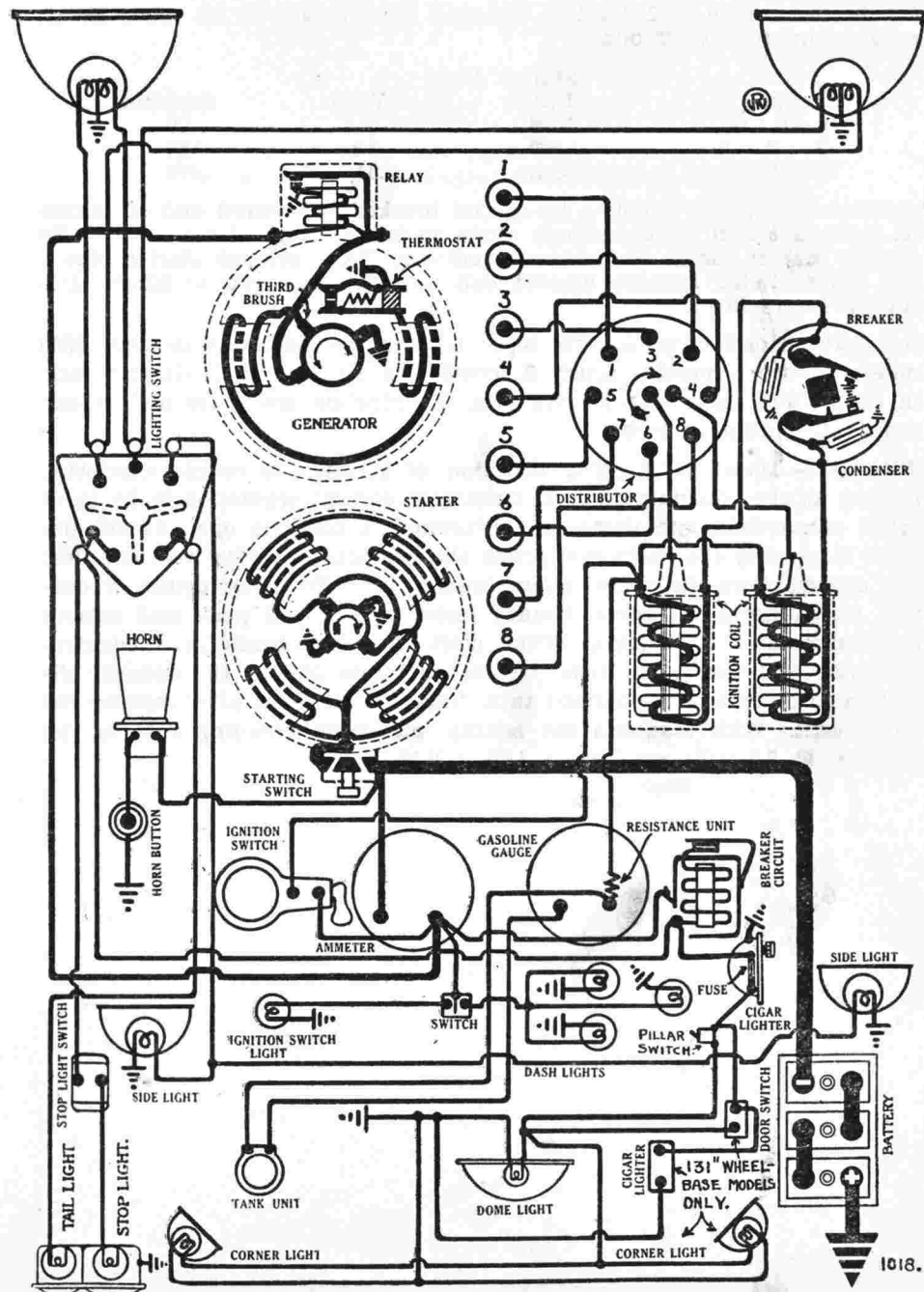
**Distributor:**—Model 668-A. Breaker contacts separate .020 inch. Adjust contacts by loosening lockscrew and turning eccentric adjusting screw on stationary contact mounting plate. Resurface contacts with a fine flat file or on a medium hard oilstone. Breaker arm spring tension is 18-21 ounces. Distributor is semi-automatic. Maximum manual advance is 25 degrees (engine). Automatic advance begins at 600 R.P.M. Maximum automatic advance is 24 degrees reached at 2700 R.P.M. of the engine. Breaker has two sets of contacts on a single four-sided cam opening alternately at intervals of 45 degrees corresponding to 90 degrees of crankshaft speed. This firing interval is important and must be correctly set. See Timing.

**Mounting:**—Distributor is mounted on cylinder head. To remove distributor disconnect primary lead and manual advance rod and remove head with high tension cables intact. Then loosen advance arm clamp screw and lift distributor from place.

**Oiling:**—Fill the grease cup on the side of the distributor shaft with medium cup grease and turn down two turns every 2500 miles or once a month. Remove the distributor head and rotor and saturate the wick oiler in the center of the shaft with light engine oil and put a small amount of vaseline on the face of the breaker cam every 2500 miles or once a month.

**Timing:**—There are two sets of breaker contacts operating on a four sided cam. Contacts open alternately at intervals of 45 degrees corresponding to 90 degrees of crankshaft rotation. Each set of contacts controls one coil and fires 4 spark plugs. The electrical circuit of each set of contacts is entirely separate. One set of breaker contacts begins to separate when the piston entering power stroke reaches top dead center with the manual advance lever advanced two-thirds. To set timing, crank engine over until piston No. 1 enters compression stroke (the upstroke with both valves closed). Fully advance spark lever and then move lever back one-third toward retarded position. Continue to crank engine until piston No. 1 reaches top dead center when the flywheel mark "UDC-1-8" will be opposite the indicator on the flywheel case. If one set of contacts are not opening loosen the advance arm clamp bolt and rotate the distributor housing until contacts open. Tighten the clamp bolt and crank engine over 90 degrees until piston No. 6 reaches top dead center with the flywheel mark "UDC-3-6" opposite the indicator. If the second set of contacts are not separating loosen lockscrews on breaker plate and turn eccentric adjusting screw until contacts open. Check contact gap. If outside limits of .018-.024 inch reset at .022 inch and repeat operation.

**VALVE TIMING:**—INLET VALVES:—Head diameter, 1  $\frac{21}{32}$  inches; stem diameter,  $\frac{3}{8}$  inch; stem length, 5  $\frac{5}{8}$  inches. Tappet clearance is .003 inch (cold). Spring pressure is 98-108 pounds. Valve lift is 1  $\frac{11}{32}$  inch. Intake valves opens 5 degrees after top dead center and closes 45 degrees after lower dead center. The point of inlet opening is marked on the flywheel by "IN-OP-1-8."



# STUDEBAKER

"PRESIDENT"

PRODUCTION STARTED AUGUST, 1928

DELCO-REMY GENERATING, STARTING SYSTEM  
DELCO-REMY IGNITION

**EXHAUST VALVES:**—Head diameter, 1 9/16 inches; stem diameter, 3/8 inch; stem length, 5 1/2 inches. Tappet clearance is .007 inch (cold). Spring pressure is 98-108 pounds. Valve lift is 11/32 inch. Exhaust valves open 40 degrees before lower dead center and close 12 degrees after top dead center. Valve stem guides are removable. Oversize valve stems are not made.

**Firing Order:**—The firing order is 1-6-2-5-8-3-7-4.

**Spark Plugs:**—Spark plugs are 7/8-18 S.A.E. Standard. Gaps are .025 inch.

**STARTER:**—Model 724-H. Starter is connected to the engine through a manual pinion shift. The direction of rotation is counter-clockwise, looking at the commutator end. Starter cranks the engine at 90 R.P.M. drawing 165 amperes at 5.2 volts. Brush spring tension is 24-28 ounces.

Starter Data			
Torque	R.P.M.	Volts	Amperes
0 lb. ft.	2850	5.65	70
3 "	1300	5.2	165
22 "	Lock	3.0	585

**Mounting:**—Starter is flange mounted at left of engine. To remove starter, disconnect cable and pedal rod and remove 3 flange mounting capscrews. Then pull starter forward and lift from place.

**Oiling:**—Put 4 or 5 drops of light engine oil in starter bearing oilers every 2500 miles or once a month. Once each year remove grease plug in gear compartment and repack gears with medium grease.

**GENERATOR:**—Model 955-C. The direction of rotation is counter-clockwise, looking at the commutator end. The generator current regulation is by third brush shunt field and thermostat. Thermostat contacts open at 165 degrees F. inserting the resistance across the contacts in series with the shunt field and reducing the output approximately 40%. To adjust generator output, loosen the small round screw on the generator endplate and remove the commutator cover band. Then shift the third brush in a counter-clockwise direction to increase the charging rate and in the opposite direction to decrease the charging rate. Tighten the screw after

making the adjustment. With standard car setting the maximum charging rate is 9-12 amperes at 7.3-7.6 volts reached at 2150 R.P.M.

Generator Data		
Hot Test		
Amperes	Volts	R.P.M.
0	6.4	710
7	7.1	1120
10	7.4	1500
12	7.6	2150
10	7.4	2800

Motoring generator draws 5.5 amperes at 6 volts. Shunt field current is 5 amperes at 6 volts. Generator brush spring tension is 18 ounces.

**Mounting:**—Generator is mounted on left of engine at forward end by special hinge bracket and is driven by the fan belt. To remove generator, disconnect lead and remove adjustment locknut in engine forward mounting flange and swing generator toward engine. Slip off fan belt. Then remove cotter and withdraw mounting bracket hinge pin. Lift generator from place.

**Oiling:**—Put 4 or 5 drops of light engine oil in the generator bearing oilers every 2500 miles or once a month.

**RELAY:**—Model 265-B. Relay is mounted on the generator. Relay closes at 12 1/2 M.P.H. or 650 R.P.M. when the generator voltage reaches 6.4 volts and opens with a discharge current of 1 ampere. Relay contacts separate .015-.025 inch. Air gap is .014 inch with contacts closed.

**LIGHTING:**—Delco-Remy Switch Model 484-D. Switch is mounted at lower end of steering column. Head lights are 6-8 volt, 21-21 cp. (double filament-double contact). Mazda No. 1110. Side, dash and tail lights are 6-8 volt, 3 cp. S.C. Mazda No. 63. Stop, dome and corner lights are 6-8 volt, 6 cp. S.C. Mazda No. 81.

**CIRCUIT BREAKER:**—Model 410-C. A vibrating circuit breaker is mounted on the dash to protect the lighting lines. The circuit breaker begins to operate with a current flow of 25-30 amperes. While vibrating it limits the current to 15 amperes.





# AUBURN

MODEL 6-80 (1929), SERIAL NUMBERS 2,981,851 UP  
PRODUCTION STARTED DECEMBER 15, 1928  
DELCO-REMY GENERATING, STARTING SYSTEM  
DELCO-REMY IGNITION

**BATTERY:**—U.S.L. Type XY-13X-6, 6 volt. The positive (+) terminal is grounded. Starting capacity (20 minute rate) is 90 amperes for 20 minutes. Lighting capacity (5 ampere rate) is 5 amperes for 17 hours. Battery is mounted under front seat on right side.

**IGNITION:**—Coil Model 528-C. Coil is mounted under the cowl. Ignition current is 4 amperes at 6 volts with engine running and 6 amperes at 6 volts with engine stopped.

**Distributor Model 641-F.** Breaker contacts separate .020 inch. Set contact gap by loosening lock screw on stationary contact mounting plate and turning eccentric adjusting screw until proper gap is secured with breaker arm on lobe of cam. Resurface contacts when necessary with a fine flat contact file or on a medium hard oilstone. Breaker arm spring tension is 17-21 ounces. Distributor is semi-automatic. Maximum manual advance is 20 degrees (engine). Maximum automatic advance is 22 degrees. Ignition switch is an Electrolock. Electrolock must be removed as a unit with the distributor.

**Mounting:**—Distributor is mounted on the cylinder head and must be removed from the right side. To remove distributor, remove Electrolock from dash, disconnect manual advance rod and remove head with cable intact. Then loosen set screw in side of shaft housing and pry up on distributor until it can be lifted from place.

**Oiling:**—Fill the grease cup with medium grease and turn down one turn every month or each 1000 miles. Put a small bit of vaseline on the face of the breaker cam.

**Timing:**—Breaker contacts begin to separate when the piston entering power stroke reaches a position 6 degrees (on the flywheel) past top dead center with the spark control lever in the fully retarded position. To set timing, crank engine over until piston No. 1 enters compression stroke (the up stroke with both valves closed). Fully retard spark lever. Continue to crank engine until piston reaches a position 6 degrees past top dead center when the flywheel mark '1-6DC' will be three teeth past the indicator on the flywheel housing. Loosen the advance arm clamp screw and rotate the distributor until contacts begin to separate. Tighten the clamp screw and connect the spark plug in cylinder No. 1 to the terminal directly opposite the rotor. Connect the remaining spark plugs in order 5-3-6-2-4 counter-clockwise around the distributor head.

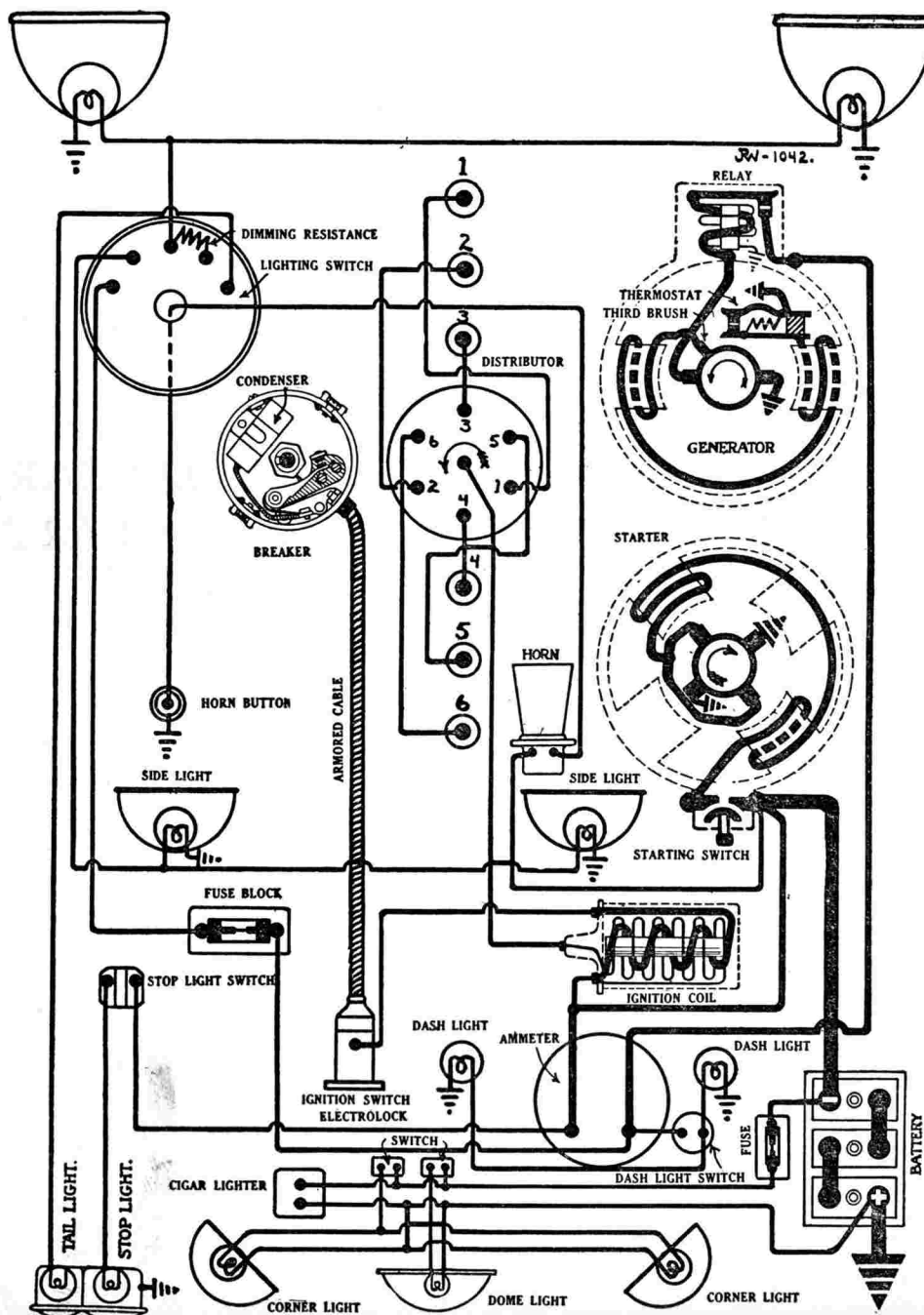
**Firing Order:**—The firing order is 1-5-3-6-2-4.

**Spark Plugs:**—Spark plugs are  $\frac{7}{8}$ -18 S.A.E. Standard. Gaps are .030 inch.

**VALVE TIMING:**—INLET VALVES:—Head diameter, 1  $\frac{17}{32}$  inches. Stem diameter, .3425-.341 inch. Stem length, 5  $\frac{1}{4}$  inches. Valve lift,  $\frac{11}{32}$  inch. Spring pressure, 47 pounds (valve closed). Tappet clearance, .006 inch (hot). Inlet valves open at top dead center and close 45 degrees after lower dead center.

**EXHAUST VALVES:**—Head diameter, 1  $\frac{13}{32}$  inches. Stem diameter, .3425-.341 inch. Stem length, 5  $\frac{1}{4}$  inches. Valve lift,  $\frac{11}{32}$  inch. Spring pressure, 47 pounds (valve closed). Tappet clearance, .008 inch (hot). Exhaust valves open 50 degrees before lower dead center and close 10 degrees after top dead center. The flywheel is marked '1-6DC' for inlet opening. Valve stem guides are removable. Oversize valves are made.

**STARTER:**—Model 716-C. Starter is connected to the engine through a Bendix drive. The direction of rotation is clockwise (armature shaft), viewed from



# AUBURN

MODEL 6-80 (1929), SERIAL NUMBERS 2,981,851 UP  
PRODUCTION STARTED DECEMBER 15, 1928  
DELCO-REMY GENERATING, STARTING SYSTEM  
DELCO-REMY IGNITION

the commutator end. Brush spring tension is 24-28 ounces. Starter cranks the engine at 90 R.P.M. drawing 150 amperes at 6 volts.

Starter Data			
Torque	R.P.M.	Volts	Amperes
0 lb. ft.	3000	5	70
15 "	Lock	3.7	450

**Mounting:**—Starter is flange mounted at right of engine on forward side of flywheel housing. To remove starter, disconnect cable and remove flange mounting cap screws. Pull starter forward and lift from place.

**Oiling:**—Put 4 or 5 drops of light engine oil in the oiler on the commutator end of the starter every month or each 1000 miles. The drive end bearing is oilless.

**GENERATOR:**—Model 955-H. The direction of rotation is counter-clockwise, viewed from the commutator end. Generator current regulation is by third brush shunt field and thermostat. Thermostat contacts open at 175°F. cutting the resistance across the thermostat contacts in series with the field and reducing the output approximately 40%. To adjust charging rate, remove the commutator cover band and loosen the small round headed screw on the generator end plate. Then shift the third brush by hand in a counter-clockwise direction to increase the charging rate and in the opposite direction to decrease the charging rate. Tighten the screw after making the adjustment. With standard car setting, maximum charging rate is 21 amperes (cold) reached at 1650 R.P.M.

Generator Data					
Cold Test			Hot Test		
Amperes	Volts	R.P.M.	Amperes	Volts	R.P.M.
19-21	8.35-8.5	1450	9-12	7.35-7.65	1800-2000

Motoring, generator draws 5.5 amperes at 6 volts. Shunt field current is 4-6.1 amperes at 6 volts. Brush spring tension is 14-18 ounces.

**Mounting:**—Generator is mounted on special swinging bracket at right of engine and is belt driven from the crankshaft. The water pump is mounted directly on the rear of the generator and is driven by the generator shaft. To remove generator, first drain radiator and remove water pump hose connections. Then loosen adjustment clamp bolt and swing generator toward the engine. Slip off the drive belt. Then remove two bolts in the bracket under the generator and lift generator from place. The water pump can be removed by taking out the cap screws on the generator bosses.

**Belt Adjustment:**—To adjust belt tension, loosen the adjustment clamp bolt and swing the generator away from the engine until the correct belt tension is secured. Tighten the clamp bolt. Do not make the drive belt too tight or it will crowd the generator bearings.

**Oiling:**—Put 4 or 5 drops of light engine oil in each generator oiler every month or each 1000 miles.

**RELAY:**—Model 265-B. Relay is mounted on the generator. Relay contacts close at 600 R.P.M. when the generator voltage reaches 6.75 volts and open with a discharge current of 0-2.5 amperes. Relay contacts separate .015-.025 inch. Air gap is .014-.020 inch with contacts closed.

**LIGHTING:**—Soreng-Manegold Switch. Lighting switch is mounted at lower end of steering column. Dimming is through a resistance mounted on the switch. Headlights are 6-8 volt, 21 cp. S.C. Mazda 1129. Side lights are 6-8 volt, 3 cp. S.C. Mazda 63. Stop light is 6-8 volt, 15 cp. S.C. Mazda 87. Dash, tail, dome and corner lights are each 6-8 volt, 3 cp. S.C. Mazda 63.

**FUSE:**—Lighting fuse on block on dash is 20 ampere capacity.



# AUBURN

**MODEL 8-90 (1929) SERIAL NUMBERS 2,971,829 UP**  
**PRODUCTION STARTED DECEMBER 15, 1928**  
**DELCO-REMY GENERATING, STARTING SYSTEM**  
**DELCO-REMY IGNITION**

**BATTERY:**—U.S.L. Type XY-13X-6, 6 volt. The positive (+) terminal is grounded. Starting capacity (20 minute rate) is 90 amperes for 20 minutes. Lighting capacity (5 ampere rate) is 5 amperes for 17 hours. Battery is mounted under front seat on right side.

**IGNITION:**—Coil Model 528-C. Coil is mounted under the cowl. Ignition current is 4 amperes at 6 volts with engine running and 6 amperes at 6 volts with engine stopped.

**Distributor Model 657-M.** Breaker contacts separate .020 inch. Set contact gap by loosening lock screw on stationary contact mounting plate and turning eccentric adjusting screw until proper gap is secured with breaker arm on lobe of cam. Resurface contacts when necessary with a fine flat contact file or on a medium hard oilstone. Breaker arm spring tension is 18-21 ounces. Breaker has two sets of contacts on a four sided cam. Contacts open alternately at intervals of 45 degrees (equal to 90 degrees of crankshaft rotation). Contacts must be synchronized to secure this result for correct engine performance. See Timing. Distributor is semi-automatic. Maximum manual advance is 15 degrees. Maximum automatic advance is 15 degrees. The ignition switch is an Electrolock.

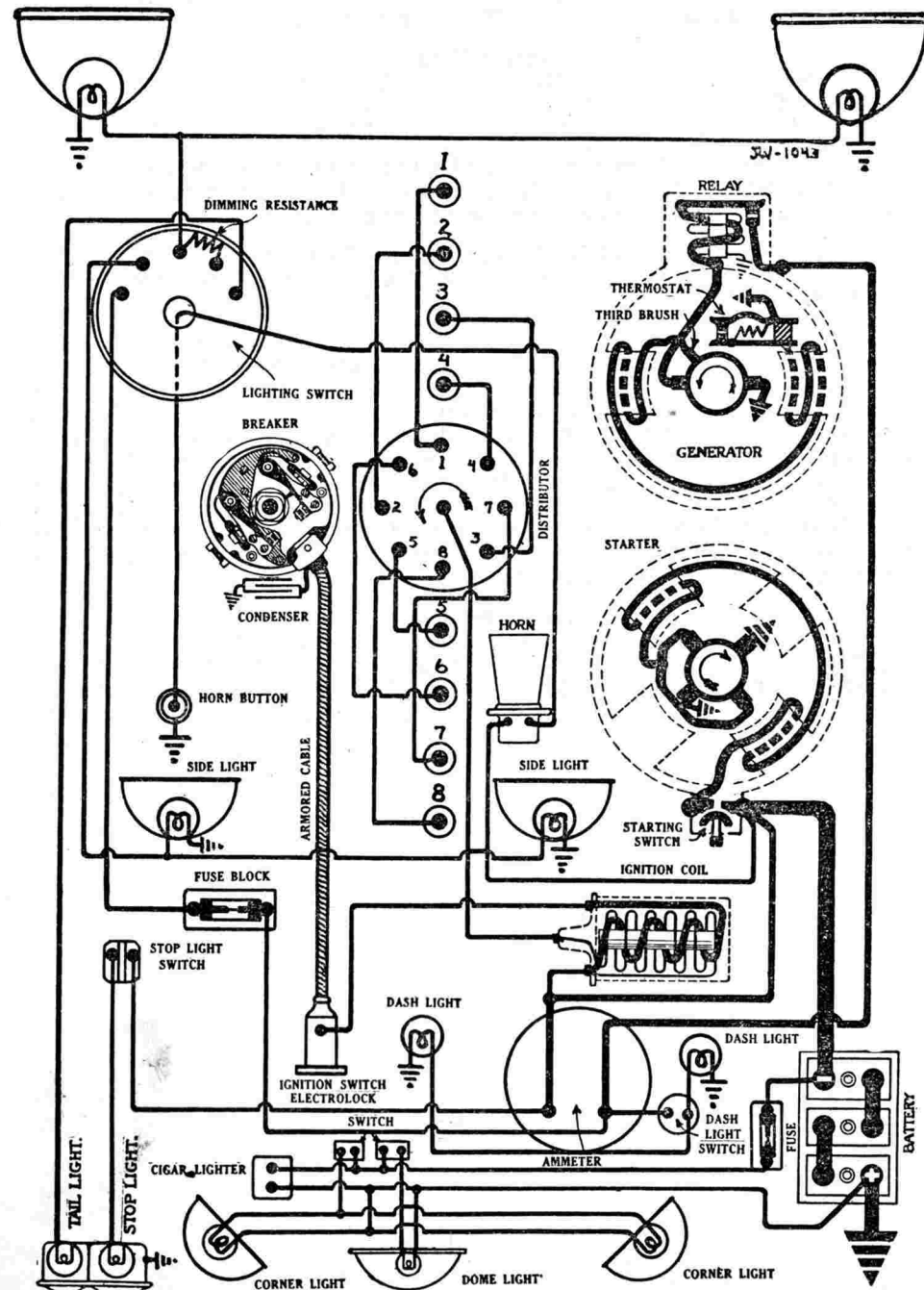
**Mounting:**—Distributor is mounted on the cylinder head. The Electrolock must be removed as a unit with the distributor. To remove distributor, disconnect Electrolock from dash, disconnect manual advance rod and remove distributor head with cables intact. Then remove set screw in side of shaft housing and pry up distributor until it can be lifted from place.

**Oiling:**—Fill the grease cup on the side of the shaft with medium grease and turn down one turn every month or each 1000 miles. Remove the head and rotor and saturate the wick oiler in the center of the shaft with light engine oil and put a small bit of vaseline on the face of the breaker cam every 1000 miles.

**Timing:**—Synchronization of Contacts:—To synchronize contacts, use special Delco-Remy Tool No. 820738 and follow directions on Page S-31. Contacts can be synchronized without tool after distributor is timed to engine by cranking engine over 90 degrees from firing position of piston No. 1 when piston No. 6 will be 3 teeth past top dead center. If the second set of contacts are not separating, loosen the two lock screws and turn the eccentric adjusting screw until contacts begin to open. Tighten the lock screws and check the contact gap with the breaker arm on the lobe of the cam. If outside limits of .018-.024 inch, reset at .022 inch and repeat synchronizing operation.

**Timing Distributor to Engine:**—Breaker contacts separate when the piston entering power stroke reaches a position 6 degrees or 3 teeth on the flywheel past top dead center with the spark control lever in the fully retarded position. To set timing, crank engine over until piston No. 1 enters compression stroke (the up stroke with both valves closed). Fully retard spark lever. Continue to crank engine until a point on the flywheel 3 teeth past the dead center mark '1-8DC' is opposite the indicator on the flywheel case. Then loosen advance arm clamp screw and rotate distributor until contacts begin to separate. Tighten the clamp screw and connect the terminal opposite the rotor to the spark plug in cylinder No. 1. Connect the remaining spark plugs in order 6-2-5-8-3-7-4 counter-clockwise around the distributor head.

**Firing Order:**—The firing order is 1-6-2-5-8-3-7-4.



# AUBURN

MODEL 8-90 (1929) SERIAL NUMBERS 2,971,829 UP  
PRODUCTION STARTED DECEMBER 15, 1928  
DELCO-REMY GENERATING, STARTING SYSTEM  
DELCO-REMY IGNITION

**Spark Plugs:**—Spark plugs are  $\frac{7}{8}$ -18 S.A.E. Standard. Gaps are .030 inch.

**VALVE TIMING:**—**INLET VALVES:**—Head diameter, 1 17/32 inches. Stem diameter, .3425-.341 inch. Stem length, 5 1/4 inches. Valve lift, 11/32 inch. Spring pressure, 47 pounds (valve closed). Tappet clearance, .006 inch (hot). Inlet valves open at top dead center and close 45 degrees after lower dead center.

**EXHAUST VALVES:**—Head diameter, 1 13/32 inches. Stem diameter, .3425-.341 inch. Stem length, 5 1/4 inches. Valve lift, 11/32 inch. Spring pressure, 47 pounds (valve closed). Tappet clearance, .008 inch (hot). Exhaust valves open 50 degrees before lower dead center and close 10 degrees after top dead center. The flywheel is marked '1-8DC' for inlet opening. Valve stem guides are removable. Oversize valves are made.

**STARTER:**—Model 716-C. Starter is connected to the engine through a Bendix drive. The direction of rotation is clockwise (armature shaft), viewed from the commutator end. Brush spring tension is 24-28 ounces. Starter cranks the engine at 90 R.P.M. drawing 150 amperes at 6 volts.

Starter Data			
Torque	R.P.M.	Volts	Amperes
0 lb. ft.	3000	5	70
15 "	Lock	3.7	450

**Mounting:**—Starter is flange mounted at right of engine on forward side of flywheel housing. To remove starter, disconnect cable and remove flange mounting cap screws. Pull starter forward and lift from place.

**Oiling:**—Put 4 or 5 drops of light engine oil in the oiler on the commutator end of the starter every month or each 1000 miles.

**GENERATOR:**—Model 955-H. The direction of rotation is counter-clockwise, viewed from the commutator end. Generator current regulation is by third brush shunt field and thermostat. Thermostat contacts open at 175°F. cutting the resistance across the thermostat contacts in series with the field and reducing the output approximately 40%. To adjust generator output, remove the commutator cover band and loosen the small round headed screw on the generator end plate. Then shift the third brush by hand in a counter-clockwise direction to increase the charging rate and in the oppo-

site direction to decrease the charging rate. Tighten the screw after making the adjustment. With standard car setting, maximum charging rate is 21 amperes (cold) reached at 1450 R.P.M.

Generator Data					
Cold Test			Hot Test		
Amperes	Volts	R.P.M.	Amperes	Volts	R.P.M.
19-21	8.35-8.5	1450	9-12	7.35-7.65	1800-2000

Motoring, generator draws 5.5 amperes at 6 volts. Shunt field current is 4-6.1 amperes at 6 volts. Brush spring tension is 14-18 ounces.

**Mounting:**—Generator is mounted on special swinging bracket at right of engine and is belt driven from the crankshaft. The water pump is mounted directly on the rear of the generator and is driven by the generator shaft. To remove generator, first drain radiator and remove water pump hose connections. Then loosen adjustment clamp bolt and swing generator toward the engine. Slip off drive belt. Then remove two bolts mounting generator on bracket and lift generator from place.

**Belt Adjustment:**—To adjust belt tension, loosen bracket bolts and adjustment clamp bolt and swing generator away from the engine until the proper belt tension is secured. Tighten the bolts. Do not get too much belt tension or it will crowd the generator bearings.

**Oiling:**—Put 4 or 5 drops of light engine oil in the oiler at each end of the generator every month or each 1000 miles.

**RELAY:**—Model 265-B. Relay is mounted on the generator. Relay contacts close at 600 R.P.M. when the generator voltage reaches 6.75 volts and open with a discharge current of 0-2.5 amperes. Relay contacts separate .015-.025 inch. Air gap is .014 inch with contacts closed.

**LIGHTING:**—Soreng-Manegold Switch. Lighting switch is mounted at lower end of steering column. Dimming is by resistance mounted on switch. Headlights are double filament using the 2 cp. filament as an auxiliary headlight. Headlights are 6-8 volt, 21-2 cp. D.C. Mazda 1158. Side lights are 6-8 volt, 3 cp. S.C. Mazda 63. Stop light is 6-8 volt, 15 cp. S.C. Mazda 87. Dash, dome, corner and tail lights are each 6-8 volt, 3 cp. S.C. Mazda 63.

**FUSES:**—Lighting fuse mounted on block on dash is 20 ampere capacity.

# AUBURN

**MODEL 120, SERIAL NUMBERS 2,950,502 UP**  
**PRODUCTION STARTED DECEMBER 15, 1928**  
**DELCO-REMY GENERATING, STARTING SYSTEM**  
**DELCO-REMY IGNITION**

**BATTERY:**—U.S.L. Type XY-15X-6, 6 volt. The positive (+) terminal is grounded. Starting capacity (20 minute rate) is 119 amperes for 20 minutes. Lighting capacity (5 ampere rate) is 5 amperes for 21 hours. Battery is mounted under front seat on right side.

**IGNITION:**—Coil Model 528-C. Coil is mounted under the cowl. Ignition current is 4 amperes at 6 volts with engine running and 6 amperes at 6 volts with engine stopped.

**Distributor Model 657-L.** Breaker contacts separate .022 inch. Set contact gap by loosening lock screw on stationary contact mounting plate and turning eccentric adjusting screw until correct gap is secured with breaker arm on lobe of cam. Resurface contacts when necessary with a fine flat contact file or on a medium hard oilstone. Breaker arm spring tension is 18-21 ounces. Breaker has two sets of contacts on a four sided cam. Contacts open alternately at intervals of 45 degrees (equal to 90 degrees of crankshaft rotation). Contacts must be synchronized to secure this result, for correct engine performance. See Timing. Distributor is semi-automatic. Maximum manual advance is 15 degrees. Maximum automatic advance is 18 degrees. The ignition switch is an Electrolock.

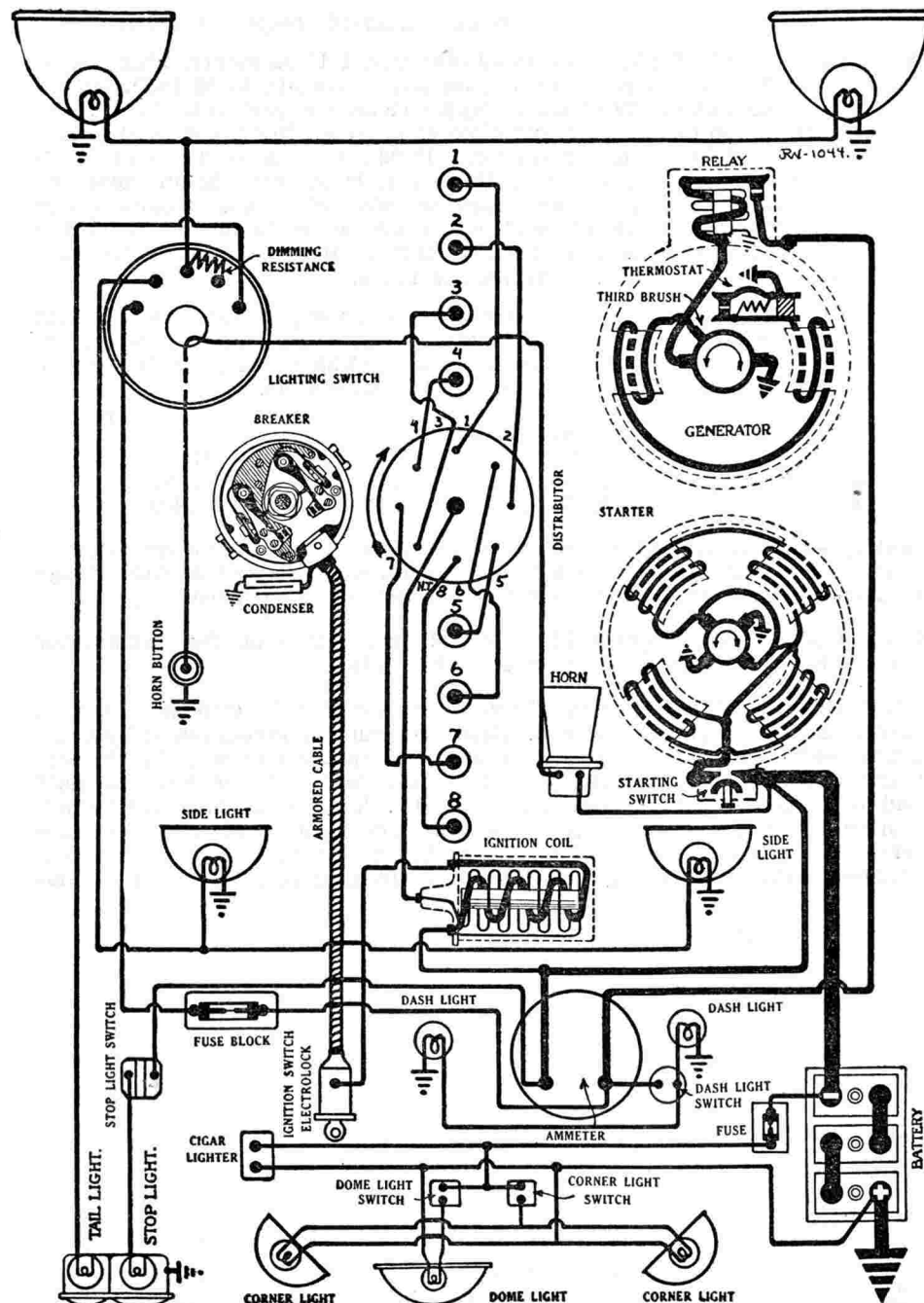
**Mounting:**—Distributor is mounted on the cylinder head and can be removed from the right side. The Electrolock must be removed as a unit with the distributor. To remove distributor, disconnect Electrolock at dash, disconnect manual advance rod and remove distributor head with cables intact. Then remove set screw in side of shaft housing and pry distributor up until it can be lifted from place.

**Oiling:**—Fill the grease cup on the side of the shaft with medium grease and turn down one turn every month or each 1000 miles. At the same time, remove the distributor head and rotor and saturate the wick oiler in the center of the shaft with light engine oil and put a small bit of vaseline on the face of the breaker cam.

**Timing:**—**Synchronization of Contacts:**—To synchronize contacts, use special Delco-Remy Tool No. 820738 and follow directions given on Page S-31. Contacts can be synchronized without use of tool after distributor has been timed to engine by cranking engine over 90 degrees when piston No. 6 will reach firing position (3 teeth on the flywheel after top dead center with spark retarded). If the second set of contacts are not opening, loosen two lock screws and turn eccentric adjusting screw until contacts begin to separate. Tighten the lock screws and check the contact gap with the breaker arm on the lobe of the cam. If outside limits of .018-.024 inch, reset at .022 inch and repeat synchronizing operation.

**Timing Distributor to Engine:**—Breaker contacts begin to separate when the piston entering power stroke reaches a position 6 degrees or 3 teeth on the flywheel past top dead center with the spark lever fully retarded. To set timing, crank engine over until piston No. 1 enters compression stroke (the up stroke with both valves closed). Fully retard spark lever. Continue to crank engine until a point on the flywheel 3 teeth past the dead center mark '1-8DC' is opposite the indicator on the flywheel housing. Then loosen advance arm clamp screw and rotate distributor until one set of contacts begins to separate. Tighten the clamp screw and connect the terminal opposite the rotor to the spark plug in cylinder No. 1. Connect the remaining spark plugs as shown on the diagram.

**Firing Order:**—The firing order is 1-6-2-5-8-3-7-4.





# AUBURN

MODEL 120, SERIAL NUMBERS 2,950,502 UP  
PRODUCTION STARTED DECEMBER 15, 1928  
DELCO-REMY GENERATING, STARTING SYSTEM  
DELCO-REMY IGNITION

**Spark Plugs:**—Spark plugs are  $\frac{7}{8}$ -18 S.A.E. Standard. Gaps are .030 inch.

**VALVE TIMING:**—**INLET VALVES:**—Head diameter,  $1\frac{15}{32}$  inches. Stem diameter, .3425-.341 inch. Stem length,  $4\frac{7}{8}$  inches. Valve lift,  $11\frac{1}{32}$  inch. Spring pressure, 45.5 pounds (valve closed). Tappet clearance, .006 inch (hot). Inlet valves open at top dead center and close 45 degrees after lower dead center. The flywheel is marked '1-8DC' for inlet opening.

**EXHAUST VALVES:**—Head diameter,  $1\frac{15}{32}$  inches. Stem diameter, .3425-.341 inch. Stem length,  $4\frac{7}{8}$  inches. Valve lift,  $11\frac{1}{32}$  inch. Spring pressure, 45.5 pounds (valve closed). Tappet clearance, .008 inch (hot). Exhaust valves open 50 degrees before lower dead center and close 10 degrees after top dead center. Valve stem guides are removable. Oversize valves are made.

**STARTER:**—Model 718-A. Starter is connected to the engine through a Bendix drive. The direction of rotation is counter-clockwise, viewed from the commutator end. Brush spring tension is 24-28 ounces. Starter cranks the engine at 100 R.P.M. drawing 200 amperes at 6 volts.

Starter Data			
Torque	R.P.M.	Volts	Amperes
0 lb. ft.	6000	5	65
15 "	Lock	3.15	570

**Mounting:**—Starter is flange mounted at right of engine on forward side of flywheel housing. To remove starter, disconnect cable and remove flange mounting cap screws. Then pull starter forward and lift from place.

**Oiling:**—Put 4 or 5 drops of light engine oil in the oiler on the commutator end of the starter every month or each 1000 miles. The drive end bearing is oilless.

**GENERATOR:**—Model 955-J. The direction of rotation is counter-clockwise, viewed from the commutator end. Generator current regulation is by third brush shunt field and thermostat. Thermostat contacts open at 175°F. cutting the resistance across the thermostat contacts in series with the field

and reducing the output approximately 40%. To adjust generator output, remove the commutator cover band and loosen the small round headed screw on the generator end plate. Then shift the third brush by hand in counter-clockwise direction to increase the charging rate and in the opposite direction to decrease the charging rate. Tighten the screw after making the adjustment. With standard setting, maximum charging rate is 21 amperes (cold) at 8.5 volts reached at 1450 R.P.M.

Generator Data					
Cold Test			Hot Test		
Amperes	Volts	R.P.M.	Amperes	Volts	R.P.M.
19-21	8.35-8.5	1450	9-12	7.35-7.65	1800-2000

Motoring, generator draws 5.5 amperes at 6 volts. Shunt field current is 4-6.1 amperes at 6 volts. Brush spring tension is 14-18 ounces.

**Mounting:**—Generator is flange mounted at right of engine on rear of timing chain case. To remove generator, disconnect lead and take off plate on front of chain case. Take out cap screws in generator flange, lift off drive chain and hang up in gear case with wire so that it can not slip off camshaft sprocket. Then pull generator to rear and lift from place.

**Oiling:**—Put 4 or 5 drops of light engine oil in each of the generator bearing oilers every month or each 1000 miles.

**RELAY:**—Model 265-B. Relay is mounted on the generator. Relay contacts close at 600 R.P.M. when the generator voltage reaches 6.75 volts and open with a discharge current of 0-2.5 amperes. Relay contacts separate .015-.025 inch. Air gap is .014 inch with contacts closed.

**LIGHTING:**—Soreng Manegold Switch. Switch is mounted at lower end of steering column. Dimming is by resistance on switch. Headlights are 6-8 volt, 21 cp. S.C. Mazda 1129. Side or cowl lights are 6-8 volt, 3 cp. S.C. Mazda 63. Stop light is 6-8 volt, 15 cp. S.C. Mazda 87. Dash, dome, corner and tail lights are each 6-8 volt, 3 cp. S. C. Mazda 63.

**FUSES:**—Lighting fuse on block on dash is 20 ampere capacity.

# BLACKHAWK

BLACKHAWK SIX SERIES L (1929) SERIAL NUMBERS 16,001 UP

PRODUCTION STARTED DECEMBER 4, 1928

DELCO-REMY GENERATING, STARTING, SYSTEM

DELCO-REMY IGNITION

**BATTERY:**—Prest-O-Lite, Type 615-J, 6 volt. The negative (—) terminal is grounded. Starting capacity (20 minute rate) is 120 amperes for 20 minutes. Lighting capacity (5 ampere rate) is 5 amperes for 20 hours. Battery is mounted under the left front seat.

**IGNITION:**—Coil Model 527-A (two used). Coils are mounted under the hood on the right side. Ignition current is 10 amperes at 6 volts with engine stopped and 6 amperes at 6 volts with engine running.

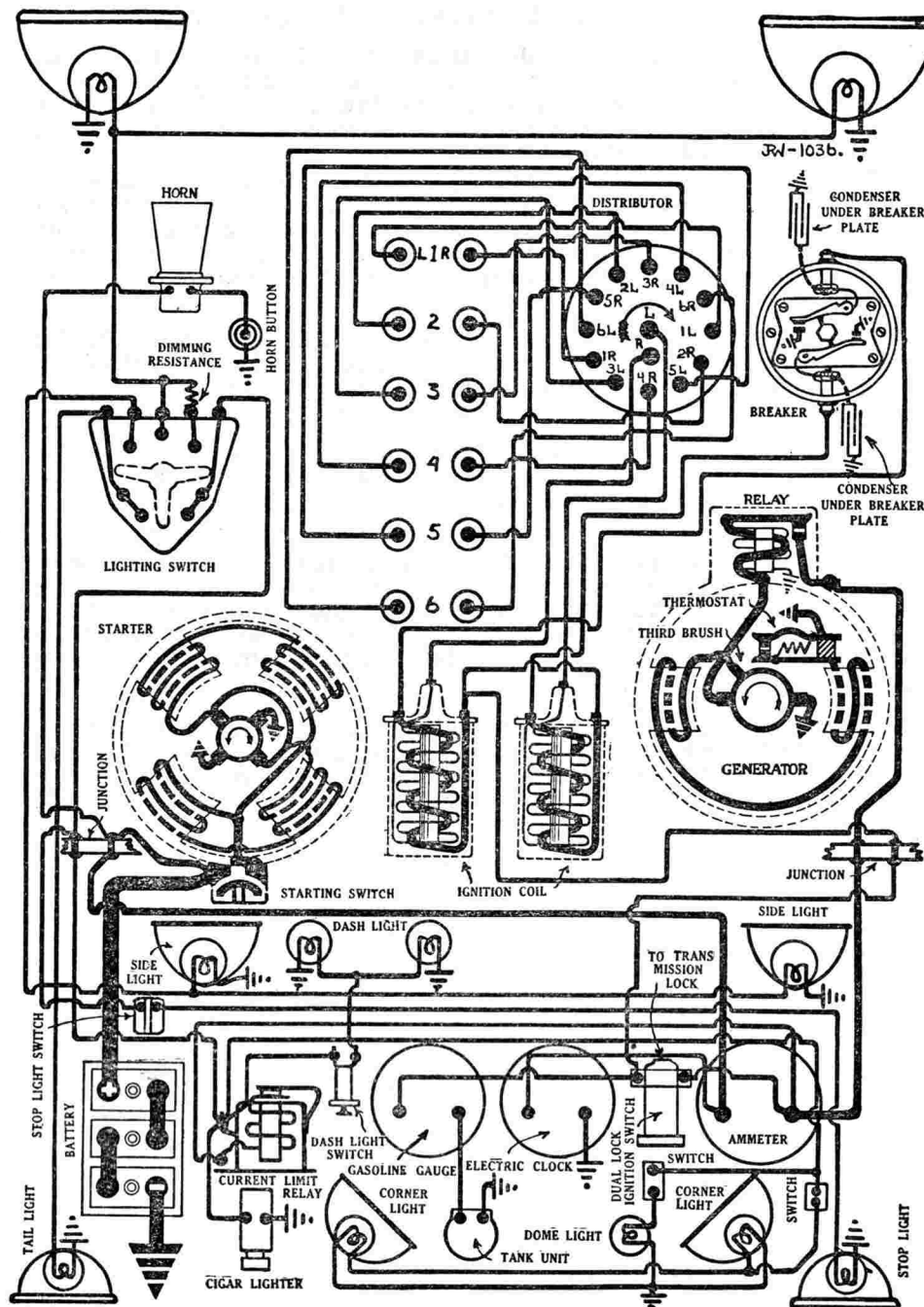
**Distributor Model 4043.** Breaker contacts separate .017 inch. Set contact gap by loosening lock nut on stationary contact mounting stud and turning up stud until correct gap is obtained with breaker arm on lobe of cam. Re-surface contacts when necessary with a fine flat contact file or on a medium hard oilstone. Breaker arm spring tension is 17-21 ounces. Distributor is semi-automatic. Maximum manual advance is 38 degrees (engine). Automatic advance begins at 400 R.P.M. (engine). Maximum automatic advance is 22 degrees reached at 2600 R.P.M. There are two sets of contacts on a six sided cam. Contacts open simultaneously and each set of contacts controls one coil and fires one set of spark plugs. The electrical circuit of each coil is entirely separate except that one distributor is used. Contacts must be synchronized for correct performance. See Timing.

**Mounting:**—Distributor is mounted on accessory bracket at right of engine. To remove distributor, disconnect manual advance rod and primary leads and remove distributor head with cables intact. Then remove manual advance stop screw and lift distributor from place.

**Oiling:**—Put 8 or 10 drops of light engine oil in the oiler on the side of the distributor every 750 miles. Every 1000 miles remove the distributor head and rotor and put a small amount of vaseline on the face of the breaker cam and oil the breaker arm pivot pins with light engine oil.

**Timing:**—**Synchronization of Contacts:**—Contacts must be synchronized so that they open at the same instant firing both spark plugs in each cylinder simultaneously. Connect a six volt lamp in each primary circuit. Turn ignition on and crank engine over slowly. The lamps will go out as each set of contacts open. If both lamps go out at the same instant the contacts are synchronized. If they do not, loosen the four lock screws on the breaker plate and shift the plate causing one set of contacts to open earlier or later until synchronization is effected. Then tighten lock screws and check contact gap with breaker arm on lobe of cam. If outside limits of .015-.020 inch, reset at .017 inch and repeat synchronization.

**Timing Distributor to Engine:**—Breaker contacts begin to open when the piston entering power stroke reaches a position 15 degrees before top dead center with the spark lever in the fully advanced position. To set timing, crank engine over until piston No. 1 enters compression stroke (the upstroke with both valves closed). Fully retard spark lever and continue to crank engine until piston reaches top dead center when the flywheel mark "Top C 1 & 6" will be in the center of the inspection hole in the upper flywheel case. Then advance spark lever exactly 6/10 of the total range with the ignition turned on. At this point the ammeter should drop from an indicated discharge of 10 amperes to '0'. If it drops in two stages of 5 amperes each it indicates that the contacts are not synchronized. If the ammeter reading does not drop at this point, loosen the lock screw in the center of the breaker cam and carefully rotate cam until contacts open. Tighten the lock screw and connect the segment opposite the rotor segment connected



# BLACKHAWK

BLACKHAWK SIX SERIES L (1929) SERIAL NUMBERS 16,001 UP  
PRODUCTION STARTED DECEMBER 4, 1928  
DELCO-REMY GENERATING, STARTING SYSTEM  
DELCO-REMY IGNITION

to the terminal in the center of the distributor head to right hand spark plug in cylinder No. 1. Connect the remaining spark plugs as shown on the diagram.

**Firing Order:**—The firing order is 1-5-3-6-2-4. Spark plugs are connected 1R-6L-5R-2L-3R-4L-6R-1L-2R-5L-4R-3L clockwise around the distributor head. Spark plugs are right (R) and left (L) in the cylinder head as viewed from the driver's seat and No. 1 cylinder is nearest the radiator.

**Spark Plugs:**—Spark plugs are 18 MM. Metric Standard. Gaps are .022 inch.

**VALVE TIMING:**—Specifications:—Head diameter, 1 21/32 inches. Stem diameter, 3/8 inch. Stem length, 6 11/32 inches (top of seat to end of stem). Valve lift, 11/32 inch. Spring pressure, 102 pounds with valve open (spring length, 2 5/64 inches) and 56 pounds with valve closed (spring length, 2 27/64 inches). Tappet clearance or lash between valve cap and cam, .028 inch. Valve stem guides are removable. Oversize valves are not made.

**Valve Timing:**—Inlet valves open 7 degrees after top dead center and close 47 degrees after lower dead center. Exhaust valves open 49 degrees before lower dead center and close 7 degrees after top dead center.

**To Set Valve Timing:**—Cam shaft sprocket should be taken off cam shaft and automatic adjusting sprocket must be off engine. Crank engine over until piston No. 1 reaches a position 7 degrees past top dead center when the flywheel mark 'EX.CL.1&6 IN.OP1&6' will be in the exact center of the inspection hole in the upper flywheel housing. Then turn cam shaft until the heel of the first cam at the front of the engine is directly above No. 1 valve (exhaust valve in cylinder No. 1). Set lash or clearance between valve cap and cam at .028 inch (this is very important). Then turn cam shaft in direction of rotation (clockwise) until the valve has opened and just closed. This may be determined by inserting pin in hole in valve cap and oscillating valve. The added drag when the valve seats will be perceptible. Then mesh cam shaft sprocket in upper chain and rotate sprocket counter-clockwise to take up all the slack in the driving side of the chain. Line up holes in sprocket and cam shaft flange by slipping chain one tooth at a time on the transfer sprocket. Insert four cap screws mounting sprocket on cam shaft. Mesh automatic adjusting sprocket in chain and insert eccentric adjusting hub. Wind up spiral spring one and one half turns to provide proper chain tension and insert spring tongue in nearest slot. Assemble plain washer on sprocket shaft and insert cotter.

**STARTER:**—Model 726-C. Starter is connected to the engine through a clutch and manual pinion shift connected to the starting switch. The direction of rotation is counter-clockwise, viewed from the commutator end. Brush spring tension is 24-28 ounces.

Starter Data			
Torque	R.P.M.	Volts	Amperes
0 lb. ft.	6000	5	65
15 "	Lock	3.15	570

**Mounting:**—Starter is flange mounted at left of engine on forward side of flywheel housing. To remove starter, disconnect cable and starting pedal linkage and remove three flange mounting cap screws. Then pull starter forward and lift from place.

**Oiling:**—Put 8 or 10 drops of light engine oil in the oiler on the commutator end of the starter every 750 miles. The drive end bearing is oilless.

**GENERATOR:**—Model 949-H. The direction of rotation is counter-clockwise, viewed from the commutator end. Generator current regulation is by third brush shunt field and thermostat. Thermostat contacts open at 165°F. cutting the resistance across the thermostat contacts in series with the shunt field and reducing the output approximately 40%. To adjust generator output, remove the commutator cover band and loosen the small round headed screw on the generator endplate. Then shift the third brush by hand in a counter-clockwise direction to increase the charging rate and in the opposite direction to decrease the charging rate. Tighten the screw after making the adjustment. With standard car setting, the maximum charging rate is 12 amperes (hot) at 7.6 volts reached at 2000 R.P.M. or 32 M.P.H.

Generator Data					
Cold Test			Hot Test		
Amperes	Volts	R.P.M.	Amperes	Volts	R.P.M.
19-21	8.35-8.5	1450	9-12	7.35-7.65	1800-2000

Shunt field current is 4-6.1 amperes at 6 volts. Brush spring tension is 14-18 ounces.

**Mounting:**—Generator is flange mounted at right of engine on rear of accessory bracket. To remove generator, disconnect water pump drive coupling and generator lead and remove three flange mounting cap screws. Then pull generator to rear and lift from place.

**Oiling:**—Put 8 or 10 drops of light engine oil in the oiler at each end of the generator every 750 miles.

**RELAY:**—Model 265-B. Relay is mounted on the generator. Relay contacts close at 575 R.P.M. or 8 M.P.H. when the generator voltage reaches 7-7.5 volts and open with a discharge current of 0-2.5 amperes. Contacts separate .015-.020 inch. Air gap is .014-.021 inch with contacts closed.

**LIGHTING:**—Delco-Remy Switch Model 486-G. Lighting switch is mounted at lower end of steering column. Headlights are dimmed by resistance on switch. Headlights are 6-8 volt, 32 cp. S.C. Mazda 1133. Cowl lights are 6-8 volt, 3 cp. S.C. Mazda 63. Stop light is 6-8 volt, 15 cp. S.C. Mazda 87. Dash and tail lights are each 6-8 volt, 3 cp. S.C. Mazda 63.

**CURRENT LIMIT RELAY:**—Model 410-C. This device is a vibrating circuit breaker mounted on the dash and connected in the lighting circuits. It begins to vibrate when the current flow reaches 20-30 amperes and continues limiting the current to 2-15 amperes. Contacts separate .012-.030 inch. Air gap is .019-.025 inch with contacts closed.



# BLACKHAWK

BLACKHAWK EIGHT SERIES L (1929) SERIAL NUMBERS 28,001 UP

PRODUCTION STARTED DECEMBER 4, 1928

DELCO-REMY GENERATING, STARTING SYSTEM

DELCO-REMY IGNITION

**BATTERY:**—Prest-O-Lite, Type 615-J, 6 volt. The negative (—) terminal is grounded. Starting capacity (20 minute rate) is 120 amperes for 20 minutes. Lighting capacity (5 ampere rate) is 5 amperes for 20 hours. Battery is mounted under the left front seat.

**IGNITION:**—Coil Model 528-C. Coil is mounted on the dash. Ignition current is 6 amperes at 6 volts with engine running and 10 amperes at 6 volts with engine stopped.

**Distributor Model 658-U.** Breaker contacts separate .022 inch. Set contact gap by loosening lock screw on stationary contact mounting plate and turning eccentric adjusting screw until correct gap is secured with breaker arm on lobe of cam. Resurface contacts when necessary with a fine flat contact file or on a medium hard oilstone. Breaker arm spring tension is 18-21 ounces. Distributor is semi-automatic. Maximum manual advance is 22 degrees (engine). Automatic advance begins at 600 R.P.M. (engine). Maximum automatic advance is 20 degrees reached at 3200 R.P.M. Breaker has two sets of contacts on a four sided cam. Contacts open alternately at intervals of 45 degrees corresponding to 90 degrees of crankshaft rotation. This is the correct firing interval and contacts must be synchronized for correct performance. See Timing.

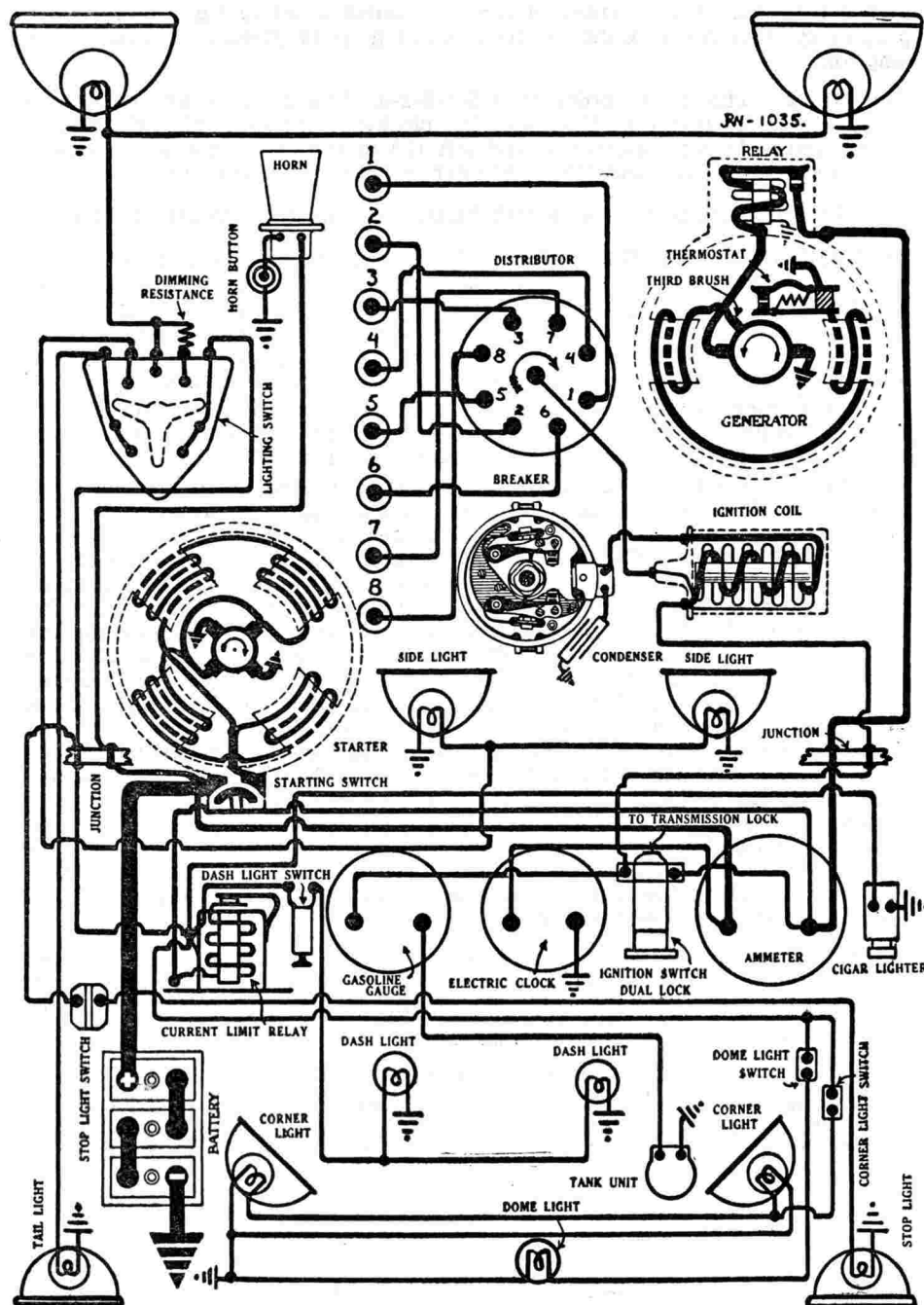
**Mounting:**—Distributor is mounted on rear of generator at right of engine. To remove distributor, disconnect primary lead and manual advance rod and remove distributor head with cables intact. Then take out manual advance stop screw and lift distributor from place.

**Oiling:**—Fill the grease cup on the side of the shaft with medium cup grease and turn down one half turn every 1000 miles. At the same time remove the distributor head and rotor and saturate the wick oiler in the center of the shaft with light engine oil and put a small amount of vaseline on the face of the breaker cam.

**Timing:**—**Synchronization of Contacts:**—To synchronize contacts, use special tool, Delco-Remy Part No. 820738 and follow directions on Page S-31. Contacts can be synchronized without tool after distributor has been timed to engine by cranking engine over 90 degrees from firing position of piston No. 1 when piston No. 6 will reach a position 10 degrees after top dead center. The second set of contacts should separate at this point. If they do not, loosen the two lock screws on the breaker plate and turn the eccentric adjusting screw until contacts begin to open. Tighten the lock screws and check the contact opening with the breaker arm on the lobe of the cam. If breaker gap is outside limits of .018-.024 inch, reset at .022 inch and repeat synchronization.

**Timing Distributor to Engine:**—Breaker contacts begin to separate when the piston entering power stroke reaches a position 10 degrees after top dead center with the spark control lever in the fully retarded position. To set timing, crank engine over until piston No. 1 enters compression stroke (the upstroke with both valves closed). Then fully retard spark control lever and continue to crank engine until piston reaches a position 10 degrees after top dead center. Loosen advance arm clamp screw and rotate distributor until contacts begin to open. Tighten the clamp screw and connect the segment opposite the rotor to the spark plug in cylinder No. 1. Connect the remaining spark plugs in order 6-2-5-8-3-7-4 clockwise around the distributor head.

**Firing Order:**—The firing order is 1-6-2-5-8-3-7-4.



# BLACKHAWK

BLACKHAWK EIGHT SERIES L (1929) SERIAL NUMBERS 28,001 UP  
PRODUCTION STARTED DECEMBER 4, 1928  
DELCO-REMY GENERATING, STARTING SYSTEM  
DELCO-REMY IGNITION

**Spark Plugs:**—Spark plugs are 18 MM. Metric Standard. Gaps are .022 inch.

**VALVE TIMING:**—**INLET VALVES:**—Head diameter, 1½ inches. Stem diameter, 21/64 inch. Stem length, 5 57/64 inches. Valve lift, 5/16 inch. Spring pressure, 62 pounds with valve closed (spring length, 2¼ inches) and 103 pounds with valve open (spring length, 1 15/16 inches). Tappet clearance, .007 inch. Inlet valves open 8 degrees after top dead center and close 40 degrees after lower dead center.

**EXHAUST VALVES:**—Head diameter, 1¾ inches. Stem diameter, 21/64 inch. Stem length, 5 57/64 inches. Valve lift, 5/16 inch. Spring pressure, 62 pounds with valve closed (spring length, 2¼ inches) and 103 pounds with valve open (spring length, 1 15/16 inches). Exhaust valves open 40 degrees before lower dead center and close 8 degrees after top dead center. Valve stem guides are removable. Oversize valves are made. Set tappet clearance at .012 inch when setting valve timing.

**STARTER:**—Model 724-J. Starter is connected to the engine through an out-board Bendix drive. The direction of rotation is clockwise, viewed from the commutator end. Brush spring tension is 24-28 ounces. Starting switch is Model 405-C.

## Starter Data

Torque	R.P.M.	Volts	Amperes
0 lb. ft.	3500	5	70
22 "	Lock	3	600

**Mounting:**—Starter is flange mounted at left of engine on forward side of fly-wheel housing. To remove starter, disconnect cable and remove three flange mounting cap screws. Then pull starter forward and lift from place.

**Oiling:**—Put 8 or 10 drops of light engine oil in the oiler at each end of the armature shaft every 1000 miles. Every six months remove the grease plug in the reduction gear case and repack gears with graphite grease.

**GENERATOR:**—Model 944-N. The direction of rotation is counter-clockwise, viewed from the commutator end. Generator current regulation is by third brush shunt field and thermostat. Thermostat contacts open at 165°F. cutting the resistance across the thermostat contacts in series with the shunt

field and reducing the output approximately 40%. To adjust generator, loosen the small round headed screw on the generator end plate and remove the commutator cover band. Then shift the third brush by hand in a counter-clockwise direction to increase the charging rate and in the opposite direction to decrease the charging rate. Tighten the screw after making the adjustment. With standard car setting the maximum charging rate is 9-12 amperes (hot) at 7.65 volts reached at 1500 R.P.M. or 32 M.P.H.

## Generator Data

Cold Test		R.P.M.	Hot Test		R.P.M.
Amperes	Volts		Amperes	Volts	
18-20	8.3-8.5	1300	9-12	7.35-7.65	1300-1500

Shunt field current is 4-6.1 amperes at 6 volts. Brush spring tension is 14-18 ounces.

**Mounting:**—Generator is flange mounted at right of engine on rear of timing chain case. To remove generator, disconnect all ignition wiring or remove distributor. Then disconnect generator lead and remove flange mounting cap screws. Pull generator to rear and lift from place.

**Oiling:**—Put 8 or 10 drops of light engine oil in the oiler at each end of the generator every 1000 miles.

**RELAY:**—Model 265-B. Relay is mounted on the generator. Relay contacts close at 500 R.P.M. or 8 M.P.H. when the voltage of the generator reaches 7-7.5 volts and open with a discharge current of 0-2.5 amperes. Contacts separate .015-.020 inch. Air gap is .014-.021 inch with contacts closed.

**LIGHTING:**—Delco-Remy Switch Model 486-G. Lighting switch is mounted at lower end of steering column. Headlights are dimmed by resistance on switch. Headlights are 6-8 volt, 32 cp. S.C. Mazda 1133. Cowl lights are 6-8 volt, 3 cp. S.C. Mazda 63. Stop light is 6-8 volt, 15 cp. S.C. Mazda 87. Dash and tail lights are each 6-8 volt, 3 cp. S.C. Mazda 63.

**CURRENT LIMIT RELAY:**—Model 410-C. This device is a vibrating circuit breaker mounted on the dash and connected in the lighting circuits. It begins to vibrate when the current flow reaches 20-30 amperes and continues limiting the current to 2-15 amperes. Contact gap is .012-.030 inch. Air gap is .019-.025 inch with contacts closed.

# CHEVROLET

## INTERNATIONAL

SERIAL NUMBERS (PASSENGER CARS AND 1/2 TON TRUCK) AC-1001 UP

SERIAL NUMBERS (1 1/2 TON TRUCK) LQ-1001 UP

DELCO-REMY GENERATING, STARTING SYSTEM

DELCO-REMY IGNITION

**BATTERY:**—Willard, U.S.L., Exide, Delco-Remy. The negative (—) terminal is grounded. Battery is mounted on right frame member under front floor boards.

**IGNITION:**—Coil Model 528-B. Coil is mounted on the dash. Ignition current is 1.9 amperes at 6 volts with engine running at 40 M.P.H. and 3 amperes at 6 volts with engine stopped.

**Distributor Model 633-G.** Breaker contacts separate .018-.024 inch. Set contact gap by loosening lock screw on crescent shaped stationery contact mounting plate and turning eccentric adjusting screw until correct gap is obtained with breaker arm on lobe of cam. Resurface contacts when necessary with a fine flat contact file or on a medium hard oilstone. Breaker arm spring tension is 17-21 ounces. Distributor is semi-automatic. Maximum manual advance is 15 degrees (engine). Automatic advance begins at 600 R.P.M. (engine). Maximum automatic advance is 26 degrees at 2400 R.P.M. Electrolock Model 427-B.

**Mounting:**—Distributor is mounted at right of engine and is driven by gears from the camshaft. To remove distributor, disconnect Electrolock at dash, disconnect manual advance rod and remove head with cables intact. Then loosen advance arm clamp screw and lift distributor out. The drive gear and slotted shaft for oil pump drive are integral with the distributor. To remove Electrolock from distributor housing, remove three screws on side of housing (two screws holding distributor head clips and one plain screw), tip the breaker plate and remove nut on end of Electrolock cable inside distributor housing. This releases cable and breaker plate.

**Oiling:**—Fill the grease cup on the side of the distributor shaft and turn down one half turn every month or each 1000 miles. At the same time remove the head and rotor and put light engine oil in the oiler in the center of the shaft and put a small bit of vaseline on the face of the breaker cam.

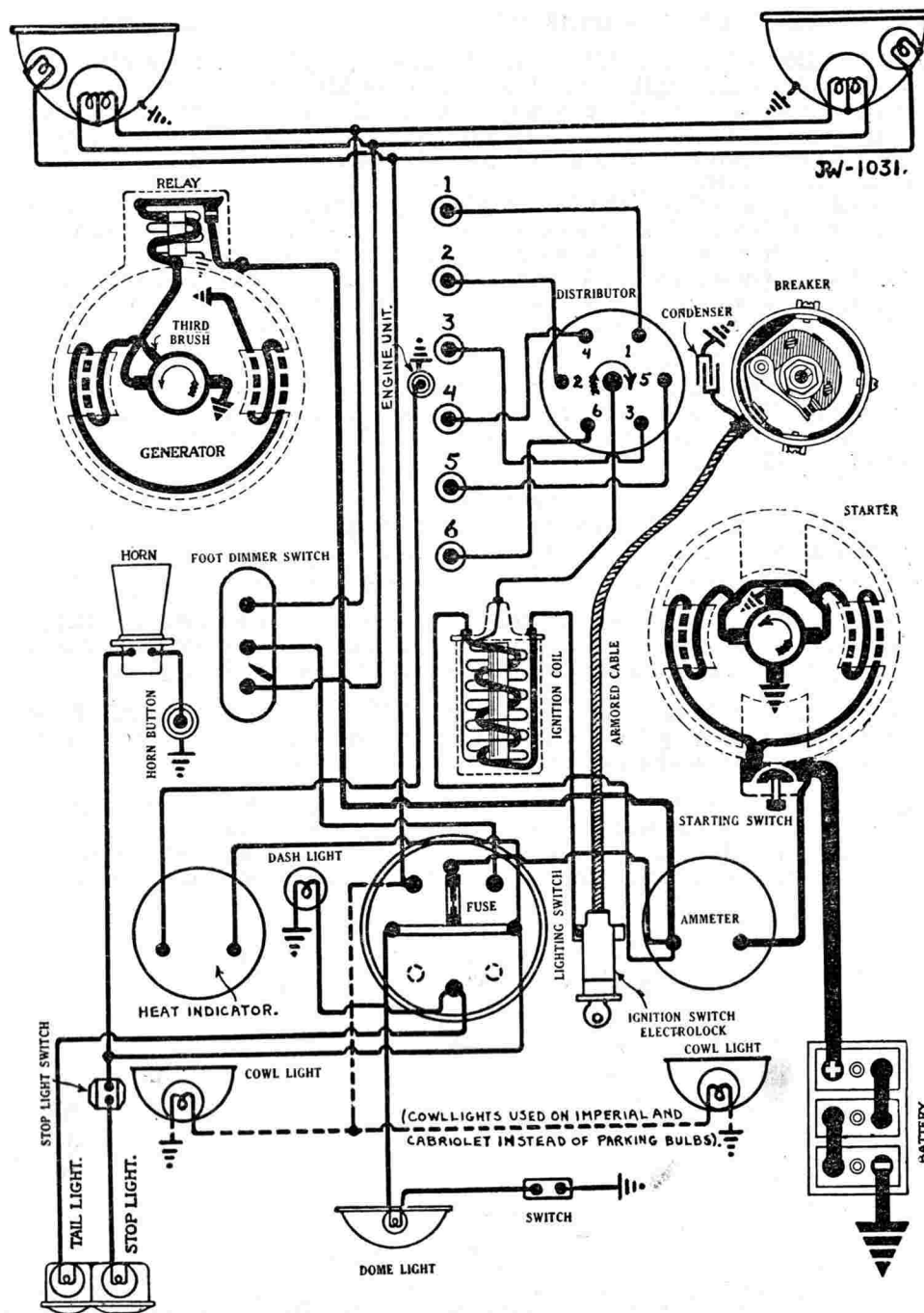
**Timing:**—Breaker contacts begin to separate when the piston entering power stroke reaches a position 15 degrees before top dead center with the spark control lever in the fully advanced position. To set timing, crank engine over until piston No. 1 enters compression stroke (the upstroke with both valves closed). Fully advance spark lever. Continue to crank engine until the flywheel mark '15' is in line with pointer on the flywheel case in the peephole on the right side of the motor when the piston will be 15 degrees before top dead center. Loosen advance arm clamp screw and rotate distributor in a counter-clockwise direction until the contacts begin to separate. Tighten the clamp screw and connect the terminal directly opposite the rotor to the spark plug in cylinder No. 1. Connect the remaining spark plugs in order 5-3-6-2-4 clockwise around the distributor head.

**Firing Order:**—The firing order is 1-5-3-6-2-4. No. 1 cylinder nearest the radiator.

**Spark Plugs:**—Spark plugs are Metric, AC. No. 140. Gaps are .025 inch.

**VALVE TIMING:**—Specifications: Head diameter, 1 13/32 inches. Stem diameter, 5/16 inch. Stem length, 4 23/32 inches. Valve lift, .277 inch. Spring pressure, 40 pounds. Tappet clearance, .006 inch (hot) inlet, and .008 inch (hot) exhaust.

**Timing:**—Inlet valves open 4 degrees after top dead center and close 42 degrees after lower dead center. Exhaust valves open 47 degrees before lower.





# CHEVROLET

## INTERNATIONAL

SERIAL NUMBERS (PASSENGER CARS AND 1/2 TON TRUCK) AC-1001 UP

SERIAL NUMBERS (1 1/2 TON TRUCK) LQ-1001 UP

DELCO-REMY GENERATING, STARTING SYSTEM

DELCO-REMY IGNITION

dead center and close 4 degrees after top dead center. The flywheel is marked at top dead center. The inlet opening point should be .14 inch on the circumference after this point.

**STARTER:—Model 714-L.** Starter is connected to the engine through a Bendix drive. The direction of rotation is counter-clockwise, viewed from the commutator end. Starter cranks the engine at 175 R.P.M. Brush spring tension is 24-28 ounces.

Starter Data			
Torque	R.P.M.	Volts	Amperes
0 lb. ft. ....	5000 .....	5 .....	65
14 " .....	Lock .....	3.63 .....	475

**Mounting:—**Starter is flange mounted at right of engine on forward side of flywheel housing. To remove starter, disconnect cable and remove flange mounting cap screws. Then pull starter forward and lift from place.

**Oiling:—**Put 8 or 10 drops of light engine oil in the oiler on the commutator end of the starter every month or each 1000 miles. The drive end bearing is oilless.

**GENERATOR:—Model 943-J.** The direction of rotation is counter-clockwise, viewed from the commutator end. Generator current regulation is by third brush shunt field. To adjust generator output, remove the commutator cover band and loosen the small round headed screw on the commutator end plate. Then shift the third brush in a counter-clockwise direction to increase the charging rate and in the opposite direction to decrease the charging rate. Tighten the screw after making the adjustment. With standard car setting the maximum charging rate is 18 amperes (cold) reached at 2100 R.P.M. or 25 M.P.H.

### Generator Data

Cold Test		R.P.M.	Hot Test		R.P.M.
Amperes	Volts		Amperes	Volts	
16-18 .....	8.2 .....	1700	11-13 .....	7.55-7.85 .....	1750-1850

Motoring generator draws 3 amperes at 6 volts. Shunt field current is 4-5.9 amperes at 6 volts. Brush spring tension is 14-18 ounces.

**Mounting:—**Generator is mounted at left of engine by special hinge bracket and is driven by the fan belt. To remove generator, disconnect lead and remove cap screw in adjustment clamp at front of generator. Swing generator toward motor, slip off drive belt and remove bolts in generator end plates holding generator on bracket. Then lift generator from place.

**Oiling:—**Put 8 or 10 drops of light engine oil in the oiler at each end of the generator every month or each 1000 miles.

**RELAY:—Model 265-H.** Relay is mounted on the generator. Relay contacts close at 750 R.P.M. or 8 M.P.H. when the generator voltage reaches 7-7.5 volts and open at 550 R.P.M. or 6 M.P.H. with a discharge current of 0-2.5 amperes. Relay contacts separate .015-.025 inch. Air gap is .014-.020 inch with contacts closed.

**LIGHTING:—Delco-Remy Switch Model 478-C. Dimmer Switch Model 465-H.** Double filament headlights are used controlled by the dimmer switch mounted on the toeboard. Lighting switch is mounted on the instrument panel. Headlights are 6-8 volt, 21-21 cp. D.C. Mazda 1110. Auxiliary headlights are 6-8 volt, 3 cp. S.C. Mazda 63. Side lights (used instead of auxiliaries on Imperial and Cabriolet models) are 6-8 volt, 3 cp. S.C. Mazda 63. Stop light is 6-8 volt, 15 cp. S.C. Mazda 87. Dome, dash and tail lights are each 6-8 volt, 3 cp. S.C. Mazda 63.

**FUSES:—**Lighting fuse mounted on back of switch is 15 ampere capacity.

# CORD

## FRONT WHEEL DRIVE—MODEL L-29 (1929) PRODUCTION STARTED JULY 1, 1929. SERIAL NUMBERS 2,925,001 UP DELCO-REMY GENERATING, STARTING SYSTEM DELCO-REMY IGNITION

The Cord as America's first Front Wheel Drive automobile to be placed in production involves a number of new features. The engine, while essentially a stock engine, is reversed in the chassis with the flywheel and transmission at the forward end. The timing chain is likewise at the forward end between the engine block and the flywheel. The crankshaft revolves counter-clockwise. The starter drives to the flywheel and is mounted on the rear of the flywheel case which is thus the forward end of the engine. The battery is mounted near the starter on a bracket above the transmission case under the engine hood. The electrical units are similar to those used on ordinary rear wheel drive cars and no trouble should be experienced in service work.

**BATTERY:**—U.S.L. Type XY-15-X-6, 6 volt. The positive (+) terminal is grounded. Starting capacity (20 minute rate) is 119 amperes for 20 minutes. Lighting capacity (5 ampere rate) is 5 amperes for 21 hours. Battery is mounted on special bracket directly above transmission case under the engine hood at the forward end of the engine.

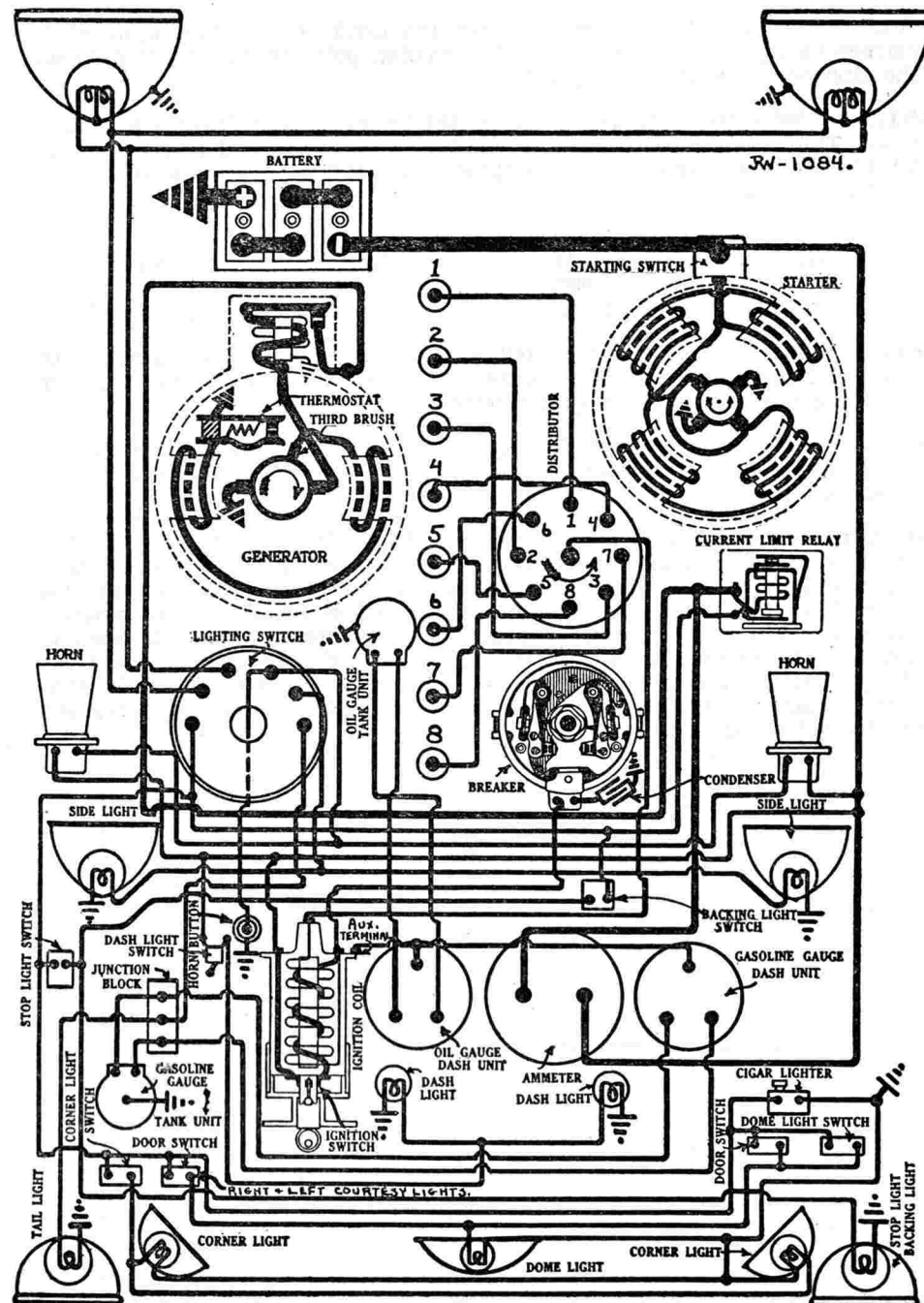
**IGNITION:**—Coil Model 526-V. Coil is mounted on the back of the instrument board with the ignition switch (which is built in the base of the coil) extending through to the face of the instrument panel. An extra terminal is located on the end of the coil from which the feed for the gasoline and oil gauge is taken. Ignition current is .6-3.0 amperes at 6 volts with engine running and 5 amperes at 6 volts with engine stopped.

**Distributor Model 658-W.** Breaker contacts separate .018-.024 inch. Set contact gap by loosening lock screw on stationary contact mounting plate and turning eccentric adjusting screw until correct gap is secured with breaker arm on lobe of cam. Resurface contacts when necessary with a fine flat contact file or on a medium hard oilstone. Breaker arm spring tension is 18-21 ounces. Distributor is semi-automatic. Maximum manual advance is 15 degrees (engine). Automatic advance begins at 800 R.P.M. of engine. Maximum automatic advance is 13-17 degrees reached at 3600 R.P.M. Distributor has two sets of contacts on a four sided cam. Contacts separate alternately at intervals of 45 degrees corresponding to the firing interval of 90 degrees on the engine crankshaft. Contacts must be synchronized for correct ignition performance. See Timing.

**Mounting:**—Distributor is mounted on the cylinder head. To remove distributor, disconnect manual control rod and primary lead and take off distributor head with cables intact. Then remove hold-down screw in advance arm and lift distributor from place.

**Oiling:**—Fill the grease cup on the side of the distributor shaft with medium cup grease and turn down one half turn every month or each 1000 miles of operation. At the same time remove the distributor head and rotor and oil the wick oiler in the center of the shaft and place a small bit of vaseline on the face of the breaker cam.

**Timing:**—Synchronization of Contacts:—To synchronize contacts use special Delco-Remy Tool and follow directions on Page S-31. Contacts can be synchronized without use of tool after distributor has been timed to engine by cranking engine over 90 degrees from firing position of piston No. 1 when piston No. 6 will reach top dead center entering power stroke. If the second set of contacts do not open at this point, loosen the two lock screws on the movable breaker plate and turn the eccentric adjusting screw until the contacts begin to open. Tighten the lock screws and check the contact with the breaker arm on the lobe of the cam. If outside limits of .018-.024 inch, reset at .022 inch and repeat synchronization.



# CORD

## FRONT WHEEL DRIVE—MODEL L-29 (1929) PRODUCTION STARTED JULY 1, 1929. SERIAL NUMBERS 2,925,001 UP DELCO-REMY GENERATING, STARTING SYSTEM DELCO-REMY IGNITION

**Timing Distributor to Engine:**—Breaker contacts begin to separate when the piston entering power stroke reaches a position 3 teeth on the flywheel before top dead center with the manual spark control in the fully advanced position. To set timing, crank engine over until piston No. 1 enters compression stroke (the engine is hand cranked in the usual way through an opening in the differential case at the front of the engine. The hand crank engages the crankshaft through an idler shaft and spur gear so that the crank should be turned clockwise in the usual way). Fully advance spark control lever. Continue to crank engine over until a point on the flywheel 3 teeth before the top dead center mark '1-8DC' is directly opposite the indicator in the inspection hole in the flywheel case. The crankshaft rotates in the opposite direction from an ordinary engine which reverses the position of the mark on the flywheel. Then loosen advance arm clamp screw and rotate distributor until one set of contacts begin to open. Tighten the clamp screw and make certain that the segment opposite the rotor is connected to the plug in cylinder No. 1.

The proper ignition setting is determined by setting breaker contacts to open at top dead center with the manual spark control fully advanced and then rotating distributor clockwise to advance spark until a slight 'ping' or spark knock is noticed throughout the speed range of the car.

**Firing Order:**—The firing order is 1-6-2-5-8-3-7-4. No. 1 cylinder nearest the radiator.

**Spark Plugs:**—Spark plugs are 18MM. Metric. Gaps are .030 inch.

**VALVE TIMING:**—**INLET VALVES:**—Head diameter, 1 $\frac{5}{8}$  inches. Stem diameter, .341-.3425 inch. Stem length, 4 $\frac{7}{8}$  inches. Valve lift, 11/32 inch. Tappet clearance, .006 inch (hot). Spring pressure, 45.5 pounds (valve closed). Inlet valves open at top dead center and close 45 degrees after lower dead center. The flywheel is marked '1-8DC' at point of inlet opening. Degrees on the flywheel can be changed into number of teeth before or after dead center by dividing the number of degrees by 3.22.

**EXHAUST VALVES:**—Head diameter, 1 15/32 inches. Stem diameter, .341-.3425 inch. Stem length, 4 $\frac{7}{8}$  inches. Valve lift, 11/32 inch. Tappet clearance, .008 inch (hot). Spring pressure, 45.5 pounds (valve closed). Exhaust valves open 50 degrees before lower dead center and close 10 degrees after top dead center. Valve stem guides are removable. Valves with oversize stems are made.

**STARTER:**—Model 724-N. Starter is connected to the engine through reduction gears and a Bendix drive. The direction of rotation is counter-clockwise, viewed from the commutator end. Brush spring tension is 24-28 ounces. Starter switch is Delco-Remy Part No. 821627.

Starter Data			
Torque	R.P.M.	Volts	Amperes
0 lb. ft.	3500	5	70
22 " "	Lock	3	600

**Mounting:**—Starter is flange mounted at right of engine on rear of flywheel case. To remove starter, disconnect engine ventilator pipe and starter cable and take out three flange mounting cap screws. Then pull starter to the

rear to clear drive and lift from place.

**Oiling:**—Put 8 or 10 drops of light engine oil in starter oiler every month or each 1000 miles of operation.

**GENERATOR:**—Model 941-T. The direction of rotation is clockwise, viewed from the commutator end. Generator current regulation is by third brush shunt field and thermostat. Thermostat contacts open at 165° cutting the resistance across the thermostat contacts in series with the shunt field and reducing the output approximately 40%. To adjust generator output, loosen the small round headed screw on the end plate and remove the commutator cover band. Then shift the third brush in a clockwise direction to increase the charging rate and in the opposite direction to decrease the charging rate. Tighten the screw after making the adjustment. With standard car setting, the maximum charging rate is 19-21 amperes at 8.5 volts reached at 1450 R.P.M.

Generator Data					
Cold Test			Hot Test		
Amperes	Volts	R.P.M.	Amperes	Volts	R.P.M.
7	7-7.3	750			
19-21	8.3-8.5	1450	9-12	7.35-7.65	1800-2000
10-12		2500			

Motoring, generator draws 5.5 amperes at 6 volts. Shunt field current is 4-6.1 amperes at 6 volts. Brush spring tension is 14-18 ounces.

**Mounting:**—Generator is base mounted at left of engine and is driven by accessory shaft from the chain case. To remove generator, disconnect lead and two screws in flexible drive coupling. Then take out four screws in base and lift generator from place.

**Oiling:**—Put 8 or 10 drops of light engine oil in each of the generator bearing oilers every month or each 1000 miles of operation.

**RELAY:**—Model 265-F. Relay is mounted on the generator. Relay contacts close at 575 R.P.M. when the generator voltage reaches 6.8-7.3 volts and open with a discharge current of 0-2.5 amperes. Relay contact gap is .015-.025 inch. Air gap is .014-.020 inch with contacts closed.

**LIGHTING:**—**Soreng Manegold Switch Model 5650-A.** Switch is mounted at the base of the steering column. Double filament headlights using a second 21 cp. filament instead of dimmers are standard equipment. Headlights are 6-8 volt, 21-21 cp. D.C. Mazda 1110. Side lights are 6-8 volt, 3 cp. S.C. Mazda 63. Stop and backing light is 6-8 volt, 15 cp. S.C. Mazda 87. Tail light is 6-8 volt, 15 cp. S.C. Mazda 87. Dash and dome lights are 6-8 volt, 3 cp. S.C. Mazda 63. Corner lights are 6-8 volt, 6 cp. S.C. Mazda 81.

**CURRENT LIMIT RELAY:**—Delco-Remy Part No. 823617. This device is a vibrating circuit breaker mounted on the dash and connected in the lighting circuits to protect them from overload. It begins to vibrate when the current reaches 25-30 amperes and continues limiting the current to 15 amperes. Circuit breaker contact gap is .012-.030 inch. Air gap is .019-.025 inch with contacts closed.



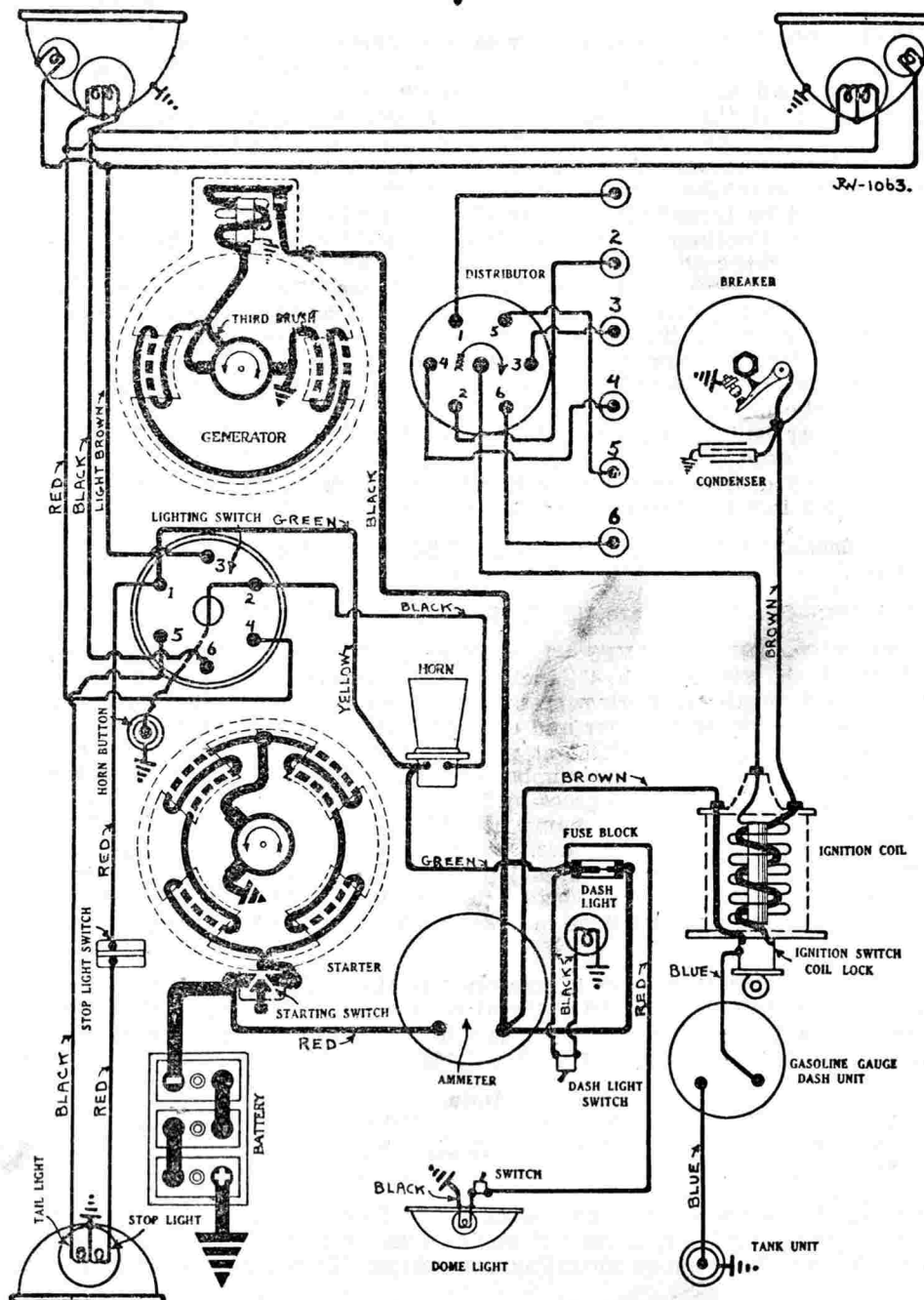
**MODEL K (1929) PRODUCTION STARTED FEBRUARY 1, 1929**  
**NORTH EAST GENERATING, STARTING SYSTEM**  
**NORTH EAST IGNITION**

**IGNITION:—Coil Type 21998.** Coil is mounted on the back of the instrument board and the ignition switch, which is built in the base of the coil, extends through to the face of the instrument panel. Ignition current is 2.5 amperes at 6 volts with engine running and 5 amperes at 6 volts with engine stopped.

**Distributor Model TBU Type 10849.** Breaker contacts separate .020 inch. Set contact gap by loosening lock nut on stationary contact stud and turning up stud until correct gap is secured with breaker arm on lobe of cam. Resurface contacts when necessary with a fine flat contact file or on a medium hard oilstone. Breaker arm spring tension is 16-20 ounces. Distributor is semi-automatic. Maximum manual advance is 20 degrees (engine). Automatic advance begins at 600 R.P.M. (engine). Maximum automatic advance is 18 degrees reached at 2500 R.P.M.

**Oiling:**—Fill the grease cup on the side of the shaft with medium cup grease and turn down two turns every month or each 1000 miles. At the same time remove the distributor head and rotor and saturate the wick oiler in the center of the shaft with light engine oil. Every 2000 miles put a small amount of vaseline on the face of the breaker cam.

**Timing:**—Breaker contacts begin to open when the piston entering power stroke reaches a position .035 inch before top dead center on standard 5.2-1 compression engines and .008 inch before top dead center on 6.2-1 high compression head engines with the manual spark lever in the fully advanced position. To set timing, remove the  $\frac{1}{8}$  inch pipe plug from the cylinder head above No. 6 piston and screw the special micrometer gauge which must be used in timing these engines in place in the tapped hole. Connect a small six volt test lamp between the distributor primary terminal and the battery terminal of the generator relay. If the battery is out of the car, connect one terminal of the lamp to a battery and ground the other battery terminal to the engine block. The test lamp will burn when the breaker contacts are closed but will go out when the contacts open, serving as an accurate check of the contact opening. Set distributor in full manual advance position. Turn engine over and locate top dead center position. Set micrometer gauge at zero on top dead center. Then crank engine over until piston No. 1 comes up on compression stroke and stop with piston .035 inch before top dead center on standard compression engines and .008 inch before top dead center on high compression engines. Take up all backlash in distributor gear by pressing rotor back against direction of rotation. Loosen the advance arm clamp screw and rotate the distributor counter-clockwise until the contacts break when the lamp will go out. Tighten the clamp screw and connect the segment opposite the rotor to the spark plug in cylinder No. 1. Connect the remaining spark plugs in order 5-3-6-2-4 clockwise around the distributor head. Check timing by cranking engine over several times and then stop when contacts break with piston No. 1 on compression stroke. The gauge should read within limits of .030-.040 inch before top dead center for standard compression engines and .006-.010 inch before top dead center for high compression engines.



# DE SOTO

## MODEL K (1929) PRODUCTION STARTED FEBRUARY 1, 1929 NORTH EAST GENERATING, STARTING SYSTEM NORTH EAST IGNITION

**Firing Order:**—The firing order is 1-5-3-6-2-4.

**Spark Plugs:**—Spark plugs are Champion Metric 18MM. Gaps are .027-.030 inch.

**VALVE TIMING:**—**INLET VALVES:**—Head diameter, 1 15/32 inches. Stem diameter, 11/32 inch. Stem length, 4 11/16 inches. Valve lift, 5/16 inch. Spring pressure, 88 pounds with valve open and 47 pounds with valve closed. Tappet clearance, .004 inch (hot). Inlet valves open 6 degrees after top dead center and close 46 degrees after lower dead center.

**EXHAUST VALVES:**—Head diameter, 1 15/32 inches. Stem diameter, 11/32 inch. Stem length, 4 11/16 inches. Valve lift, 5/16 inch. Spring pressure, 88 pounds with valve open and 47 pounds with valve closed. Tappet clearance, .006 inch (hot). Exhaust valves open 42 degrees before lower dead center and close 8 degrees after top dead center. Valve stem guides are removable. Oversize valves are not made.

**STARTER:**—Model SBH Type 6534. Starter is connected to the engine through an outboard Bendix drive. The direction of rotation is counter-clockwise, viewed from the commutator end. Brush spring tension is 3 pounds. Starter switch is Type 22050.

Starter Data			
Torque	R.P.M.	Volts	Amperes
0 lb. ft.	4000	5.6	80
1.6 "	2100	5.2	150
3.0 "	1500	5.0	200
4.3 "	1100	4.7	250
6.0 "	800	4.5	300
9.6 "	350	4.0	400
13.0 "	Lock	3.5	500

**Mounting:**—Starter is flange mounted at left of engine on forward side of fly-wheel bell housing. To remove starter, disconnect cable and remove two flange mounting cap screws. Then pull starter forward and lift from place.

**Oiling:**—Starter bearings are oilless. They require no attention.

**GENERATOR:**—Model LAB Type 6530. The direction of rotation is counter-clockwise, viewed from the commutator end. Generator current regulation is by third brush shunt field. To adjust generator output, remove the commutator cover band and loosen the lock screw on the end plate. Then shift the third brush by hand in a counter-clockwise direction to increase the charging rate and in the opposite direction to decrease the charging rate.

Tighten the lock screw after making the adjustment. With the standard car setting, the maximum charging rate is 12 amperes reached at 2000 R.P.M. or 24.5 M.P.H. with generator hot.

Generator Data					
Cold Test			Hot Test		
Amperes	Volts	R.P.M.	Amperes	Volts	R.P.M.
0	6.3	675	0	6.4	725
5	6.9	875	5	6.9	1025
10	7.4	1150	10	7.5	1500
14	7.9	1475	12	7.7	2000
16	8.1	1800	9	7.3	3000
13.4	7.8	2500			

Brush spring tension is 12-16 ounces.

**Mounting:**—Generator is mounted on special swinging bracket at left of engine and is driven by the fan belt. To remove generator, disconnect lead and loosen adjustment clamp bolt. Swing generator toward engine and take off drive belt. Then remove two bolts holding generator on bracket and lift generator from place.

**Belt Adjustment:**—To adjust fan belt, loosen the adjustment clamp bolt and swing generator out from engine until correct belt tension is secured and tighten clamp bolt. Do not get too much tension on the belt or the belt will crowd the generator bearings.

**Oiling:**—Put a few drops of light engine oil in the oiler at each end of the generator every 2000 miles.

**RELAY:**—Type 20220. Relay is mounted on the generator. Relay contacts close when the voltage of the generator reaches 6.75 volts and open with a discharge current of 1-2 amperes. Contacts separate .020-.025 inch. Air gap is .015 inch with contacts closed.

**LIGHTING:**—Soreng Manegold Switch Model 5500-A. Lighting switch is mounted at the lower end of the steering column. Headlights are double filament using the second 21 cp. filament instead of dimmers. Headlights are 6-8 volt, 21-21 cp. D.C. Mazda 1110. Parking lights on cowl are 6-8 volt, 3 cp. S.C. Mazda 63. Dash light is 6-8 volt, 3 cp. D.C. Mazda 64. Stop and tail light is 6-8 volt, 21-3 cp. D.C. 1158 (double filament bulb). Dome light is 6-8 volt, 15 cp. S.C. Mazda 87.

**FUSES:**—Lighting fuse mounted on back of instrument panel is 20 ampere capacity.

# DODGE

**DODGE BROTHERS SIX—SERIAL NUMBERS DA-1 UP**  
**PRODUCTION STARTED DECEMBER 17, 1928**  
**NORTH EAST GENERATING, STARTING SYSTEM**  
**NORTH EAST IGNITION**

**BATTERY:**—Willard, Type WSB-15, 6 volt. The positive (+) terminal is grounded. Starting capacity (20 minute rate) is 114 amperes for 20 minutes. Lighting capacity (5 ampere rate) is 5 amperes for 20 hours. Battery is mounted under the front floor board on the left side.

**IGNITION:**—Coil Type 21904. Coil is mounted on the back of the dash with the ignition switch (incorporated in the coil) extending through to the face of the instrument board. Ignition current is 4 amperes at 6 volts with engine running and 6 amperes at 6 volts with engine stopped.

**Distributor Type 10845.** Breaker contacts separate .020 inch. Set contact gap by loosening lock screw on stationary contact mounting stud and turning up stud until correct gap is secured with breaker arm on lobe of cam. Resurface contacts when necessary with a fine flat contact file or on a medium hard oilstone. Breaker arm spring tension is 16-20 ounces. Distributor is semi-automatic. Maximum manual advance is 20 degrees (engine). Automatic advance begins at 600 R.P.M. (engine). Maximum automatic advance is 15 degrees reached at 2200 R.P.M.

**Mounting:**—Distributor is mounted on the cylinder head. To remove distributor, disconnect manual advance rod and primary lead and remove distributor head with cables intact. Then take out screw at rear of control lever and lift distributor from place.

**Oiling:**—Fill the grease cup with medium cup grease and turn down one turn every two weeks or each 500 miles. At the same time remove the distributor head and rotor and put a few drops of light oil in the wick oiler in the center of the shaft. Every 2000 miles put a small bit of vaseline on the face of the breaker cam.

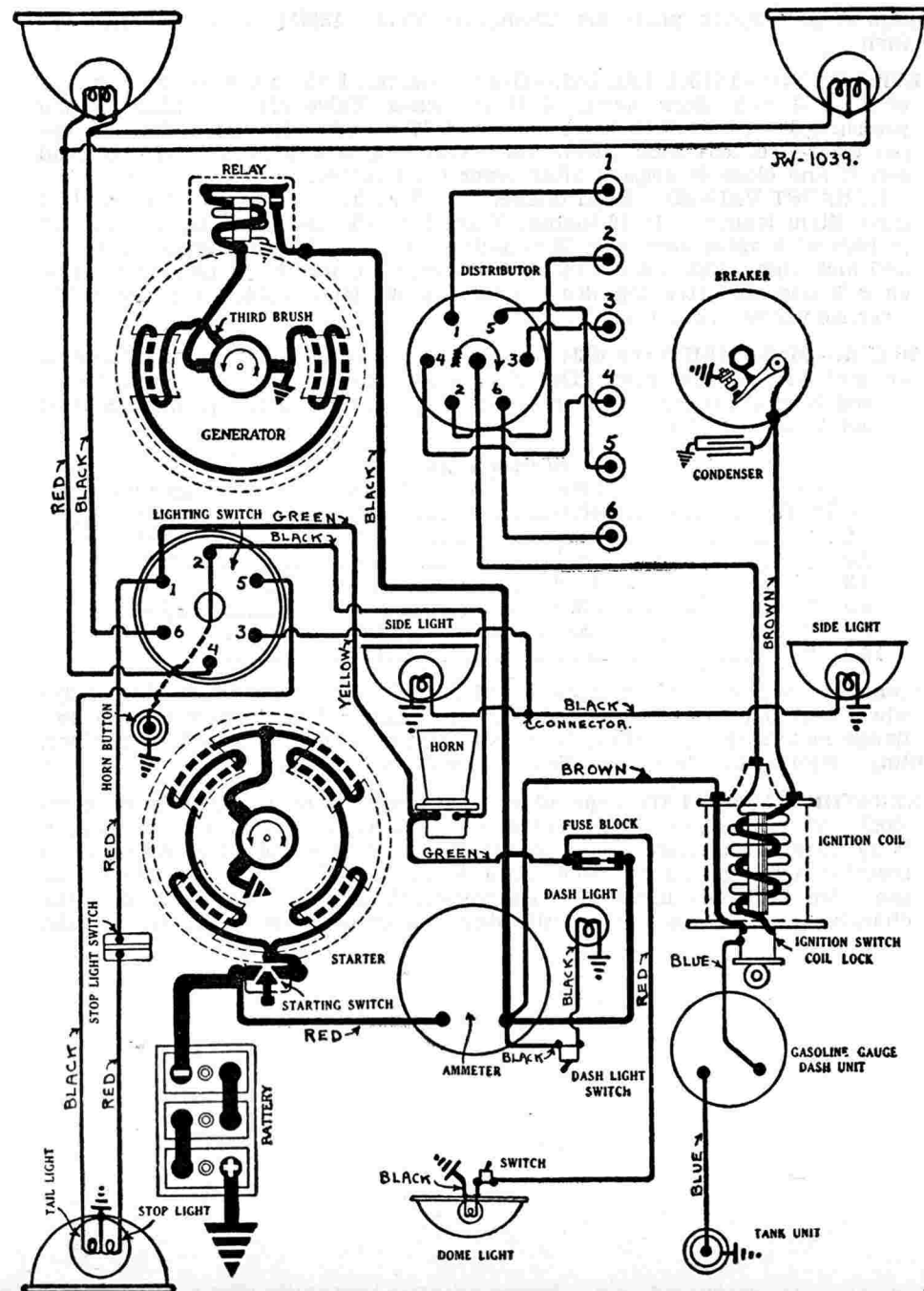
**Timing:**—Breaker contacts begin to separate when the piston entering power stroke reaches a position 4 degrees before top dead center with spark control lever in the fully advanced position. To set timing, crank engine over until piston No. 1 enters compression stroke (the up stroke with both valves closed). Fully advance spark lever and continue to crank engine until the flywheel mark 'I', which is 4 degrees before top dead center mark 'C/1-6' is opposite the indicator in the peephole in the forward face of the flywheel housing on the left side. Loosen advance arm clamp screw and rotate distributor counter-clockwise until the contacts begin to separate. Tighten the clamp screw and connect the terminal directly opposite the rotor to the spark plug in cylinder No. 1. Connect the remaining spark plugs in order 5-3-6-2-4 clockwise around the distributor head. With the correct setting, the back lash of the distributor gears should be sufficient to open and close the breaker contacts. Turn on the ignition switch and rock the distributor shaft back and forth. The pointer of the dash ammeter should fluctuate between '0' and 'Discharge' as the contacts open and close.

**Firing Order:**—The firing order is 1-5-3-6-2-4.

**Spark Plugs:**—Spark plugs are  $\frac{7}{8}$ -18 S.A.E. Standard. Gaps are .025 inch.

**VALVE TIMING:**—**INLET VALVES:**—Head diameter, 1  $\frac{21}{32}$  inches. Stem diameter,  $\frac{3}{8}$  inch. Stem length, 5  $\frac{23}{64}$  inches. Valve lift,  $\frac{5}{16}$  inch. Spring pressure, 42 pounds (valve closed). Tappet clearance, .004-.006 inch (hot). Inlet valves open at top dead center and close 48 degrees after lower dead center. The flywheel is marked 'C/1-6' at point of inlet opening.

**EXHAUST VALVES:**—Head diameter, 1  $\frac{17}{32}$  inches. Stem diameter,  $\frac{3}{8}$  inch. Stem length, 5  $\frac{23}{64}$  inches. Valve lift,  $\frac{5}{16}$  inch. Spring pressure, 42





# DODGE

## DODGE BROTHERS SIX—SERIAL NUMBERS DA-1 UP PRODUCTION STARTED DECEMBER 17, 1928 NORTH EAST GENERATING, STARTING SYSTEM NORTH EAST IGNITION

pounds (valve closed). Tappet clearance, .004-.006 inch (hot). Exhaust valves open 50 degrees before lower dead center and close 6 degrees after top dead center. Valve stem guides are removable. Oversize valves are not made.

**STARTER:—Type 6494.** Starter is connected to the engine through an outboard Bendix drive. The direction of rotation is counter-clockwise, viewed from the commutator end. Starter cranks the engine at 100 R.P.M. developing 5.5 ft. lbs. and drawing 250 amperes at 5 volts. Brush spring tension is 3 pounds. Starter switch is Type 20900.

### Starter Data

Torque	R.P.M.	Volts	Amperes
0 lb. ft.	1700	5.6	120
2.4 "	1500	5.5	140
3.9 "	1200	5.25	200
5.75 "	900	4.9	260
8.0 "	600	4.5	340
11.0 "	300	4.0	425
13.5 "	Lock	3.2	550

**Mounting:—**Starter is flange mounted at left of engine on forward side of fly-wheel housing. To remove starter, disconnect cable and starting switch connection and remove flange mounting cap screws. Then pull starter forward and lift from place.

**Oiling:—**Starter bearings are oilless. They require no attention.

**GENERATOR:—Type 6530.** The direction of rotation is counter-clockwise, viewed from the commutator end. Generator current regulation is by third brush shunt field. To adjust generator output, remove the commutator cover band and shift the third brush by hand after loosening the lock screw on the end plate. Shift the third brush in a counter-clockwise direction to increase the charging rate and in the opposite direction to decrease the charging rate. Tighten the lock screw after making the adjustment. With standard car setting, maximum charging rate is 12 amperes (hot) at 8 volts reached at 2000 R.P.M. or 37 miles per hour.

### Generator Data

Cold Test		Hot Test	
Amperes	R.P.M.	Amperes	R.P.M.
7	1000	4.5	1000
9	1200	7.5	1200
13	1400	9.5	1400
15	1600	11	1600
16	1800	11.5	1800
15.75	2000	12	2000
12	2800	11	2400

Brush spring tension is 12-16 ounces.

**Mounting:—**Generator is mounted at left of engine by special swinging bracket and is driven by the fan belt. To remove generator, disconnect lead and loosen bolt in adjustment clamp arm. Then swing generator toward engine and slip off drive belt. Then remove two bolts holding generator on hinge bracket and lift generator from place.

**Belt Adjustment:—**Fan belt is adjusted by shifting generator. To tighten belt, loosen two bolts under generator and bolt in adjustment clamp arm. Swing generator away from engine until proper belt tension is secured and tighten bolts. Do not put too much tension on the belt or it will cause excessive wear of the generator bearings.

**Oiling:—**Put a few drops of light engine oil in the oiler at each end of the generator every 2000 miles.

**RELAY:—Type 20220.** Relay is mounted on the generator. Relay contacts close at 660 R.P.M. or 11 M.P.H. when the generator voltage reaches 6.75 volts and open at 600 R.P.M. or 10 M.P.H. with a discharge current of 1-2 amperes. Contacts separate .020-.025 inch. Air gap is .015 inch with contacts closed.

**LIGHTING:—Clum Swith Model 8821.** Lighting switch is mounted at lower end of steering column. Double filament headlights are used instead of dimming. Headlights are 6-8 volt, 21-21 cp. D.C. Mazda 1110. Side lights are 6-8 volt, 3 cp. S.C. Mazda 63. Stop and tail light is 6-8 volt, 21-3 cp. D.C. Mazda 1158 (double filament bulb). Dash and corner lights are each 6-8 volt, 3 cp. S.C. Mazda 63. Dome light is 6-8 volt, 15 cp. S.C. Mazda 87.

**FUSES:—**Lighting fuse mounted on block on dash is 20 ampere capacity.

# DU PONT

## MODEL G (1929) SERIAL NUMBERS 801 UP

### DELCO-REMY GENERATING, STARTING SYSTEM DELCO-REMY IGNITION

**BATTERY:**—Exide, Type 3-XC-15-1, 6 volt. The positive (+) terminal is grounded. Starting capacity (20 minute rate) is 114 amperes for 20 minutes. Lighting capacity (5 ampere rate) is 5 amperes for 20 hours. Battery is mounted on the left frame member.

**IGNITION:**—Coil Model 525-C. Coil is mounted on the dash. Ignition current is 1.5 amperes at 6 volts with engine running and 4 amperes at 6 volts with engine stopped.

**Distributor Model 658-A.** Breaker contacts separate .022 inch. Set contact gap by loosening the lock screw on the stationary contact mounting plate directly behind the breaker arm and turning the eccentric adjusting screw until the correct gap is secured with the breaker arm on the lobe of the cam. Resurface contacts when necessary with a fine flat contact file or on a medium hard oilstone. Breaker arm spring tension is 17-21 ounces. Distributor is semi-automatic. Maximum manual advance is 15 degrees. Automatic advance begins at 300 R.P.M. Maximum automatic advance is 17 degrees reached at 1800 R.P.M. Breaker has two sets of contacts on a four sided cam. Contacts open alternately at intervals of 45 degrees corresponding to 90 degrees of crankshaft rotation. This is the correct firing interval and contacts must be synchronized to secure proper performance. See Timing.

**Mounting:**—Distributor is mounted on the cylinder head. To remove distributor, disconnect manual control rod and primary lead and remove distributor head with cables intact. Then take out stop screw in advance arm and lift distributor from place.

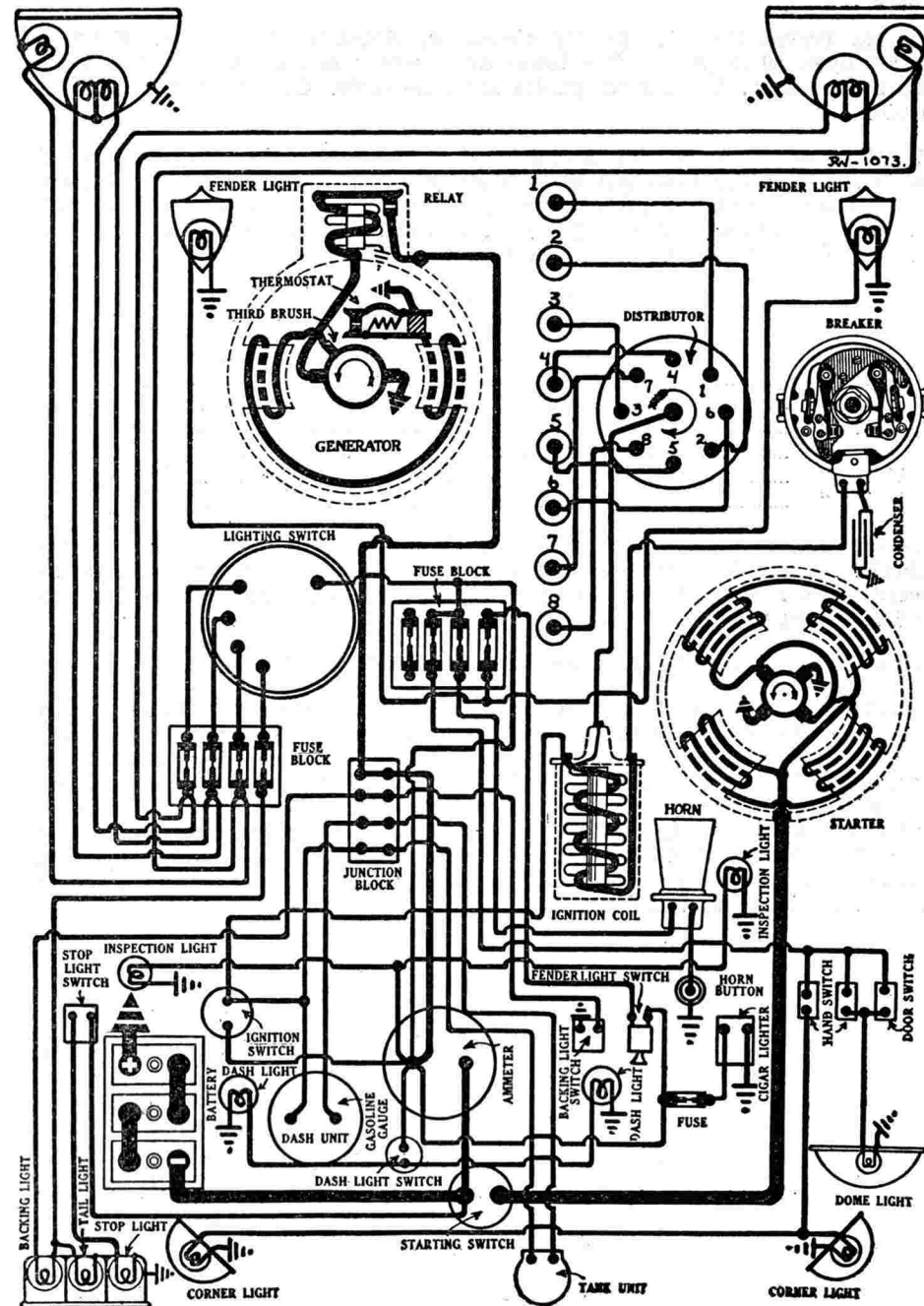
**Oiling:**—Fill the grease cup on the side of the distributor housing with medium cup grease and turn down two turns every month or each 1000 miles. At the same time remove the distributor head and rotor and saturate the wick in the oiler in the center of the shaft with light machine oil and put a small bit of vaseline on the face of the breaker cam.

**Timing:**—**Synchronization of Contacts:**—Use special Delco-Remy synchronizing tool, Part No. 820738, and follow directions on Page S-31. Breaker can be synchronized without tool after distributor has been timed to the engine by cranking engine over 90 degrees from firing position of piston No. 1 when piston No. 6 will reach top dead center entering power stroke. If the second set of breaker contacts are not separating, loosen the two lock screws and turn the eccentric adjusting screw until the contacts begin to open. Tighten the lock screws and check the contact gap with the breaker arm on the lobe of the cam. If outside limits of .018-.024 inch, reset at .022 inch and repeat synchronization.

**Timing Distributor to Engine:**—Breaker contacts begin to separate when the piston entering power stroke reaches top dead center with the manual spark control fully retarded. To set timing, crank engine over until piston No. 1 enters compression stroke. This is the up stroke with both valves closed. Retard the spark lever. Continue to crank engine until piston reaches top dead center. Then loosen advance arm clamp screw and rotate the distributor until the contacts begin to open. Tighten the clamp screw and connect the segment directly opposite the rotor to the spark plug in cylinder No. 1. Connect the remaining spark plugs in order 6-2-5-8-3-7-4 clockwise around the distributor head.

**Firing Order:**—The firing order is 1-6-2-5-8-3-7-4.

**Spark Plugs:**—Engines with aluminum head use  $\frac{7}{8}$ -18 S.A.E. Standard Short. Spark plugs in engines with cast iron heads are 18MM. metric Short. Gaps are .025 inch.



# DU PONT

## MODEL G (1929) SERIAL NUMBERS 801 UP

### DELCO-REMY GENERATING, STARTING SYSTEM

### DELCO-REMY IGNITION

**VALVE TIMING:—INLET VALVES:—**Head diameter, 1½ inches. Stem diameter, ⅜ inch. Stem length, 5½ inches. Valve lift, .370 inch. Tappet clearance, .006 inch. Inlet valves open 5 degrees after top dead center and close 50 degrees after lower dead center.

**EXHAUST VALVES:—**Head diameter, 1⅜ inches. Stem diameter, ⅜ inch. Stem length, 5½ inches. Valve lift, .370 inch. Tappet clearance, .008 inch. Exhaust valves open 40 degrees before lower dead center and close 5 degrees after top dead center. Valve stem guides are removable. Valves with oversize stems are not made.

**STARTER:—Model 720-Q.** Starter is connected to the engine through a mechanical pinion shift interconnected with the starting switch. The direction of rotation is counter-clockwise, viewed from the commutator end. Brush spring tension is 24-28 ounces.

Starter Data			
Torque	R.P.M.	Volts	Amperes
0 lb. ft.	6000	5	65
15 "	Lock	3.15	570

**Mounting:—**Starter is flange mounted at right of engine on forward side of flywheel housing. To remove starter, disconnect starter pedal linkage and starter cable. Then take out flange mounting cap screws and pull starter forward to clear drive. Lift from place.

**Oiling:—**Put 4 or 5 drops of light machine oil in the oiler on the commutator end of the starter every month or each 1000 miles. The drive end bearing is oilless.

**GENERATOR:—Model 945-U.** The direction of rotation is counter-clockwise, viewed from the commutator end. Generator current regulation is by third brush shunt field and thermostat. Thermostat contacts open at 165°F. cutting the resistance across the thermostat contacts in series with the shunt field and reducing the output approximately 40%. To adjust generator output, loosen the small round headed screw on the commutator end plate and remove the commutator cover band. Then shift the third brush by hand in

a counter-clockwise direction to increase the charging rate and in the opposite direction to decrease the charging rate. Tighten the screw after making the adjustment. With standard car setting, the maximum charging rate is 20 amperes (cold) reached at 1300 R.P.M. or 24 miles per hour.

Generator Data					
Cold Test			Hot Test		
Amperes	Volts	R.P.M.	Amperes	Volts	R.P.M.
18-20	8.3	1300	9-12	7.35-7.65	1300-1500

Motoring, generator draws 5.5 amperes at 6 volts. Shunt field current is 4-6.1 amperes at 6 volts. Brush spring tension is 14-18 ounces.

**Mounting:—**Generator is flange mounted at left of engine on rear of timing chain case. The water pump is driven by an extension of the generator shaft. To remove generator, disconnect lead and water pump drive coupling and take out flange mounting cap screws. Then pull generator to the rear and lift from place.

**Oiling:—**Put 8 or 10 drops of light engine oil in the oiler at each end of the generator every month or each 1000 miles.

**RELAY:—Model 265-B.** Relay is mounted on the generator. Relay contacts close when the generator voltage reaches 7-7.5 volts and open with a discharge current of 0-2.5 amperes. Charging current at closing of contacts is approximately 2 amperes. Contacts separate .015-.025 inch. Air gap is .014-.020 inch with contacts closed.

**LIGHTING:—Soreng Manegold Switch.** Lighting switch is mounted at lower end of steering column. Headlights are double filament using a second 21 cp. filament instead of dimmers. Headlights are 6-8 volt, 21-21 cp. D.C. Mazda 1110. Side lights (on fenders) are 6-8 volt, 3 cp. S.C. Mazda 63. Auxiliary headlights are 6-8 volt, 6 cp. S.C. Mazda 81. Stop and backing lights are 6-8 volt, 21 cp. S.C. Mazda 1129. Instrument lights, inspection lights, dome, reading lights and tail light are each 6-8 volt, 3 cp. S.C. Mazda 63.

**FUSES:—**Lighting fuses mounted in two fuse boxes are 15 ampere capacity. A separate fuse mounted on the dash is connected in the cigar lighter circuit.



# DURANT

## MODEL 40 (1929) SERIAL NUMBERS 1000 UP

### AUTO-LITE GENERATING, STARTING SYSTEM AUTO-LITE IGNITION

**BATTERY:**—U.S.L. Type 3-CVX-5X6, 6 volt. The negative (—) terminal is grounded. Starting capacity (20 minute rate) is 96 amperes for 20 minutes. Lighting capacity (5 ampere rate) is 5 amperes for 16.8 hours. Battery is mounted under the front floor boards on the right frame member and is grounded to the right clutch shaft support.

**IGNITION:**—Coil Model IG-4066. Coil is mounted on the generator at the right of the engine. Ignition current is 1.5-2 amperes at 6 volts with engine running and 4.5-5 amperes at 6 volts with engine stopped.

**Distributor Model IGB-4019A.** Breaker contacts separate .020-.025 inch. Set contact gap by loosening lock nut on stationary contact mounting stud and turning up stud until correct gap is secured with breaker arm on lobe of cam. Resurface contacts when necessary with a fine flat contact file or on a medium hard oilstone. Breaker arm spring tension is 16-20 ounces. Distributor is semi-automatic. Maximum manual advance is 25 degrees (engine). Automatic advance begins at 600 R.P.M. of engine. Maximum automatic advance is 22 degrees at 2400 R.P.M.

**Mounting:**—Distributor is mounted at right of engine on the rear of the generator. To remove distributor, disconnect primary lead and manual advance rod and remove distributor head with cables intact. Then take out hold-down screw in advance arm and lift distributor from place.

**Oiling:**—Put 4 or 5 drops of light engine oil in the oiler on the side of the distributor every two weeks or each 500 miles.

**Timing:**—Breaker contacts begin to separate when the piston entering power stroke reaches a position 9.6 degrees or 3 teeth on the flywheel before top dead center with the spark lever in the fully advanced position. To set timing, crank engine over until piston No. 1 enters compression stroke (the center mark is directly opposite the indicator line directly over the crank-up stroke with both valves closed). Fully advance spark lever and continue to crank engine over until a point on the flywheel 3 teeth before top dead shaft in the rear of the engine. The piston will then be in firing position. Loosen the advance arm clamp screw and rotate the distributor counter-clockwise until the contacts begin to open. Tighten the clamp screw and connect the segment directly opposite the rotor to the spark plug in cylinder No. 1. Connect the remaining spark plugs in order 3-4-2 clockwise around the distributor head.

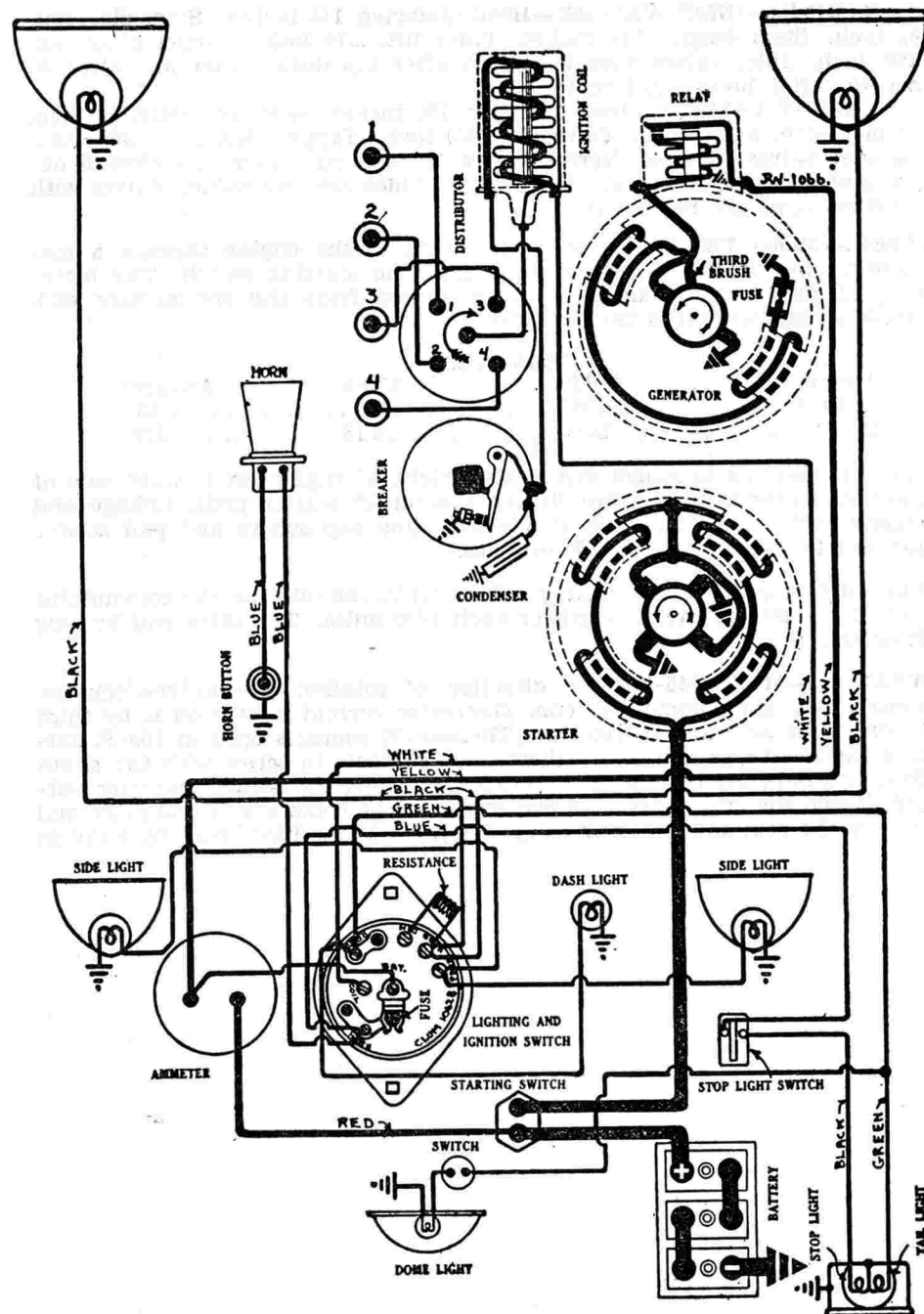
**Firing Order:**—The firing order is 1-3-4-2.

**Spark Plugs:**—Spark plugs are  $\frac{7}{8}$ -18 S.A.E. Standard. Gaps are .025 inch.

**VALVE TIMING:**—Specifications:—Head diameter,  $1\frac{5}{8}$  inches. Stem diameter, .371 inch. Stem length,  $5\frac{1}{4}$  inches. Valve lift,  $\frac{5}{16}$  inch. Spring pressure, 51 pounds (spring length,  $1\frac{13}{16}$  inches, valve closed). Tappet clearance, .006 inch (hot). Valve stem guides are removable.

**Timing:**—Inlet valves open 4 degrees after top dead center and close 46 degrees after lower dead center. Exhaust valves open 41 degrees before lower dead center and close 1 degree after top dead center.

**STARTER:**—Model MZ-4012. Starter is connected to the engine through a Bendix drive. The direction of rotation is counter-clockwise, viewed from the commutator end. Starter brush spring tension is  $2\frac{1}{2}$ -3 pounds each.



# DURANT

## MODEL 40 (1929) SERIAL NUMBERS 1000 UP

### AUTO-LITE GENERATING, STARTING SYSTEM AUTO-LITE IGNITION

#### Starter Data

Torque	R.P.M.	Volts	Amperes
0 lb. ft.	Free	6.0	50
1.5 "	1800	5.2	150
2.5 "	1325	5.0	200
5.0 "	740	4.5	300
7.6 "	220	4.0	400
12.2 "	Lock	4.0	550

**Mounting:**—Starter is cradle mounted at right of engine in front of the fly-wheel. To remove starter, disconnect cable and loosen bolts on mounting clamp band. Then lift starter from place.

**Oiling:**—Starter bearings are oilless. They require no attention.

**GENERATOR:**—Model GAL-4105. The direction of rotation is counter-clockwise, viewed from the commutator end. Generator current regulation is by third brush shunt field. To adjust generator output, remove the commutator cover band and shift the third brush by tapping on the brush mounting stud with a screwdriver. Shift the third brush in a counter-clockwise direction to increase the charging rate and in the opposite direction to decrease the charging rate. The third brush is held in position by friction between the mounting stud and the end plate. With standard car setting, the maximum charging rate is 16-17 amperes (cold) at 8 volts reached at 2075 R.P.M. or 24.2-28.4 miles per hour.

#### Generator Data

Amperes	Volts	R.P.M.
2	6.4	675
6	6.9	835
10	7.3	1025
14	7.65	1275
17.2	8.0	2075
14	7.65	2925

Brush spring tension is 24-32 ounces. Generator draws 4.7-5.7 amperes at 6 volts, motoring. Shunt field current is 4.2 amperes at 6 volts.

**Mounting:**—Generator is flange mounted at right of engine on rear of timing chain case. To remove generator, disconnect all ignition wiring or remove coil and distributor. Then take off chain inspection cover on front of chain case and remove nut on generator shaft holding sprocket in place. Then remove flange mounting cap screws and pull generator to the rear. Tie up the chain and do not crank engine with generator out.

**Oiling:**—Put 4 or 5 drops of light engine oil in the oiler on the commutator end of the generator every week or each 250 miles. Every 5000 miles remove the oil well and clean out old oil and grease. Refill with light oil. The drive end bearing is oiled from the chain case.

**RELAY:**—Model CB-4014. Relay is mounted on the generator. Relay closes at 675 R.P.M. when the generator voltage reaches 7-7.5 volts and opens with a discharge current of 0-2.5 amperes. Charging current at closing of contacts is approximately 2 amperes. Relay contacts separate .025-.035 inch. Air gap is .010-.030 inch with contacts closed.

**LIGHTING:**—Clum Switch Model 10628. Lighting switch is mounted on the instrument panel. Headlights are dimmed by a resistance on the back of the switch. Tail and stop light is a combination double filament bulb. Headlights are 6-8 volt, 21 cp. S.C. Mazda 1129. Dash, side and dome lights are each 6-8 volt, 3 cp. S.C. Mazda 63. Tail and stop light is 6-8 volt, 21-3 cp. D.C. Mazda 1158.

**FUSES:**—Generator field fuse is 5 ampere capacity. Lighting fuse on switch is 20 ampere capacity.

# DURANT

## MODEL 60 (1929) SERIAL NUMBERS 1000 UP

### AUTO-LITE GENERATING, STARTING SYSTEM AUTO-LITE IGNITION

**BATTERY:**—U.S.L. Type 3-CVX-5X6, 6 volt. The negative (—) terminal is grounded. Starting capacity (20 minute rate) is 96 amperes for 20 minutes. Lighting capacity (5 ampere rate) is 5 amperes for 16.8 hours. Battery is mounted under the front floor boards on the right frame member and is grounded to the right clutch shaft support.

**IGNITION:**—Coil Model IG-4066. Coil is mounted on the generator at the right of the engine. Ignition current is 1.5-2 amperes at 6 volts with engine running and 4.5-5 amperes at 6 volts with engine stopped.

**Distributor Model IGB-4006-B.** Breaker contacts separate .020-.025 inch. Set contact gap by loosening the lock nut on the stationary contact mounting stud and turning up the stud until the correct gap is secured with the breaker arm on the lobe of the cam. Resurface contacts whenever necessary with a fine flat contact file or on a medium hard oilstone. Breaker arm spring tension is 16-20 ounces. Distributor is semi-automatic. Maximum manual advance is 25 degrees (engine). Automatic advance begins at 600 R.P.M. of engine. Maximum automatic advance is 22 degrees at 2400 R.P.M.

**Mounting:**—Distributor is mounted at right of engine on rear of the generator. To remove the distributor, disconnect the primary lead and manual advance rod and remove the distributor head with cables intact. Then take out the hold-down screw in the advance arm and lift the distributor from place.

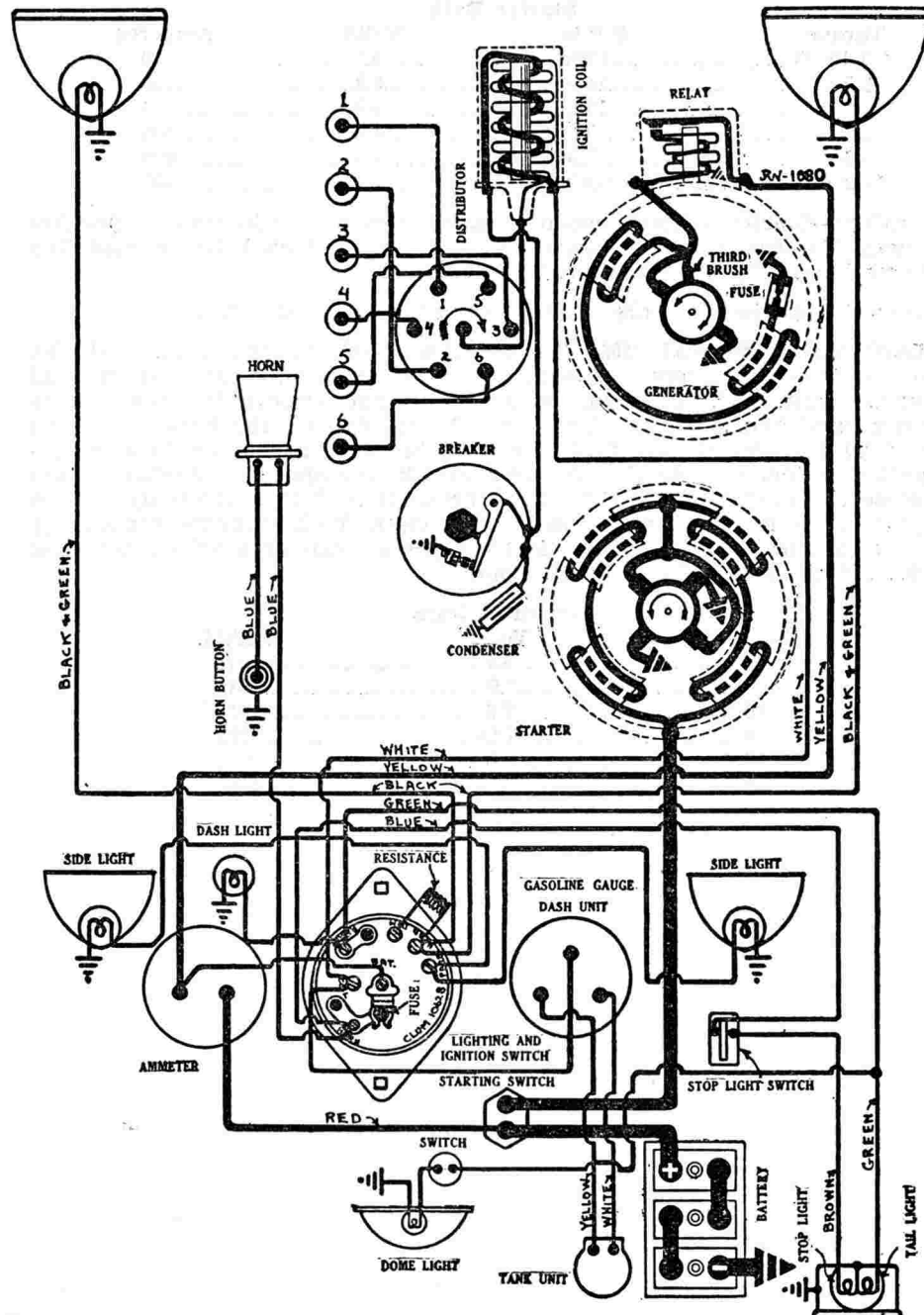
**Oiling:**—Put 4 or 5 drops of light engine oil in the oiler on the side of the distributor every two weeks or each 500 miles.

**Timing:**—Three types of cylinder heads have been used on the Model 60. These heads are marked '15LA-606'—18½%, '15LA-608'—19%, and '14LA-617'—20.9%. The marks will be found on the top of the cylinder head at the rear of the engine. On engines equipped with cylinder head 15LA-606 or 15LA-608 breaker contacts begin to separate when the piston entering power stroke reaches a position 8½ degrees or 2½ teeth on the flywheel before top dead center with the spark control fully advanced. On engines equipped with the 14LA-617 head, breaker contacts separate when the piston entering power stroke reaches a position 16 degrees 4 minutes or 5 teeth on the flywheel before top dead center with the spark control fully advanced. To set timing, crank engine over until piston No. 1 enters compression stroke (the up stroke with both valves closed). Fully advance spark control lever. Carefully note type of cylinder head on engine and continue to crank engine until a point 2½ teeth on the flywheel (on cars with 15LA-606 or 15LA-608 heads) or 5 teeth (on cars with 14LA-617 head) before the top dead center mark is directly opposite the indicator line in the engine block directly above the crankshaft. Then loosen advance arm clamp screw and rotate distributor until contacts begin to open. Tighten the clamp screw and connect the segment opposite the rotor to the spark plug in cylinder No. 1. Connect the remaining spark plugs in order 5-3-6-2-4 clockwise around the distributor head.

**Firing Order:**—The firing order is 1-5-3-6-2-4.

**Spark Plugs:**—Spark plugs are ⅞-18 S.A.E. Standard. Gaps are .025 inch.

**VALVE TIMING:**—Specifications:—Head diameter, 1⅝ inches. Stem diameter, .371 inch. Stem length, 5¼ inches. Valve lift, 5/16 inch. Spring pressure, 85 pounds (valve open—spring length, 2 inches). Tappet clearance, .006 inch (hot). Valve stem guides are removable. Valves with oversize stems are not made.





# DURANT

## MODEL 60 (1929) SERIAL NUMBERS 1000 UP

### AUTO-LITE GENERATING, STARTING SYSTEM

### AUTO-LITE IGNITION

**Timing:**—Inlet valves open 4 degrees after top dead center and close 46 degrees after lower dead center. Exhaust valves open 41 degrees before lower dead center and close 1 degree after top dead center.

**STARTER:**—Model MZ-4012. Starter is connected to the engine through a Bendix drive. The direction of rotation is counter-clockwise, viewed from the commutator end. Starter brush spring tension is 2½-3 pounds each.

Starter Data			
Torque	R.P.M.	Volts	Amperes
0 lb. ft.	Free	6.0	50
1.5 "	1800	5.2	150
2.5 "	1325	5.0	200
5.0 "	740	4.5	300
7.6 "	220	4.0	400
12.2 "	Lock	4.0	550

**Mounting:**—Starter is cradle mounted at right of engine in front of the fly-wheel. To remove starter, disconnect cable and loosen bolts on mounting clamp band. Then pull starter forward and lift from place.

**Oiling:**—Starter bearings are oilless. They require no attention.

**GENERATOR:**—Model GAL-4104. The direction of rotation is counter-clockwise, viewed from the commutator end. Generator current regulation is by third brush shunt field. To adjust generator output, remove the commutator cover band and shift the third brush by tapping on the brush mounting stud with a screwdriver. Shift the third brush in a counter-clockwise direction to increase the charging rate and in the opposite direction to decrease the charging rate. The third brush is held in position by friction between the mounting stud and the end plate. With standard car setting, the maximum charging rate is 16-17 amperes (cold) at 8 volts reached at 2075 R.P.M. or 24.2-28.4 miles per hour.

Generator Data		
Amperes	Volts	R.P.M.
2	6.4	675
6	6.9	835
10	7.3	1025
14	7.65	1275
17.2	8.0	2075
14	7.65	2925

Brush spring tension is 24-32 ounces. Generator draws 4.7-5.7 amperes at 6 volts, motoring. Shunt field current is 4.2 amperes at 6 volts.

**Mounting:**—Generator is flange mounted at right of engine on rear of timing chain case. To remove generator, disconnect all ignition wiring or remove coil and distributor. Then take off chain inspection cover on front of chain case and remove nut on generator shaft holding sprocket in place. Then remove flange mounting cap screws and pull generator to the rear. Tie up the chain and do not crank engine with generator out.

**Oiling:**—Put 4 or 5 drops of light engine oil in the oiler on the commutator end of the generator every week or each 250 miles. Every 5000 miles remove the oil well and clean out old oil and grease. Refill with light oil. The drive end bearing is oiled from the chain case.

**RELAY:**—Model CB-4014. Relay is mounted on the generator. Relay closes at 675 R.P.M. when the generator voltage reaches 7-7.5 volts and opens with a discharge current of 0-2.5 amperes. Charging current at closing of contacts is approximately 2 amperes. Relay contacts separate .025-.035 inch. Air gap is .010-.030 inch with contacts closed.

**LIGHTING:**—Clum Switch Model 10628. Lighting switch is mounted on the instrument panel. Headlights are dimmed by a resistance on the back of the switch. Tail and stop light is a combination double filament bulb. Headlights are 6-8 volt, 21 cp. S.C. Mazda 1129. Dash, side and dome lights are each 6-8 volt, 3 cp. S.C. Mazda 63. Tail and stop light is 6-8 volt, 21-3 cp. D.C. Mazda 1158.

**FUSES:**—Generator field fuse is 5 ampere capacity. Lighting fuse on switch is 20 ampere capacity.

**MODEL 66 (1929) SERIAL NUMBERS 1000 UP  
AUTO-LITE GENERATING, STARTING SYSTEM  
AUTO-LITE IGNITION**

**BATTERY:**—U.S.L. Type 3-CVX-6X6, 6 volt. The negative (—) terminal is grounded. Starting capacity (20 minute rate) is 115 amperes for 20 minutes. Lighting capacity (5 ampere rate) is 5 amperes for 21 hours. Battery is mounted under front floor boards on right frame member and is grounded to the right clutch shaft support.

**IGNITION:**—Coil Model IG-4066. Coil is mounted on the generator at the right of the engine. Ignition current is 2.5-3 amperes at 6 volts with engine running and 4.5-5 amperes at 6 volts with engine stopped.

**Distributor Model IGB-4008-B.** Breaker contacts separate .020-.025 inch. Set contact gap by loosening lock nut on stationary contact mounting stud and turning up stud until correct gap is secured with breaker arm on lobe of cam. Resurface contacts when necessary with a fine flat contact file or on a medium hard oilstone. Breaker arm spring tension is 16-20 ounces. Distributor is semi-automatic. Maximum manual advance is 20 degrees (engine). Automatic advance begins at 500 R.P.M. of engine. Maximum automatic advance is 18 degrees reached at 3350 R.P.M. A Shaler ignition lock switch is standard equipment.

**Mounting:**—The Shaler lock switch must be removed as a unit with the distributor whenever the distributor is taken off the car. After the distributor has been taken off the car the Shaler lock can be disconnected by taking off the nut on the distributor case stud inside the housing and then pulling off the trap mechanism case and stud as a unit. To remove distributor from the car, disconnect the Shaler lock at the dash and the manual spark control rod. Then take off the distributor cap with cables intact. Remove the hold-down screw in the advance arm and lift the distributor from place.

**Oiling:—**Put 4 or 5 drops of light engine oil in the oller on the side of the distributor every two weeks or each 500 miles.

**Timing:**—Breaker contacts begin to separate when the piston entering power stroke reaches a position 8.5 degrees or 2.5 teeth on the flywheel before top dead center with the spark control lever in the fully advanced position. To set timing, crank engine over until piston No. 1 enters compression stroke. This is the up stroke with both valves closed. Fully advance spark control lever. Continue to crank engine until a point on the flywheel 2.5 teeth before the top dead center mark is opposite the indicator on the flywheel case. Then loosen advance arm clamp screw and rotate distributor until contacts begin to open. Tighten the clamp screw and connect the segment opposite the rotor to the spark plug in cylinder No. 1. Connect the remaining spark plugs in order 5-3-6-2-4 clockwise around the distributor head.

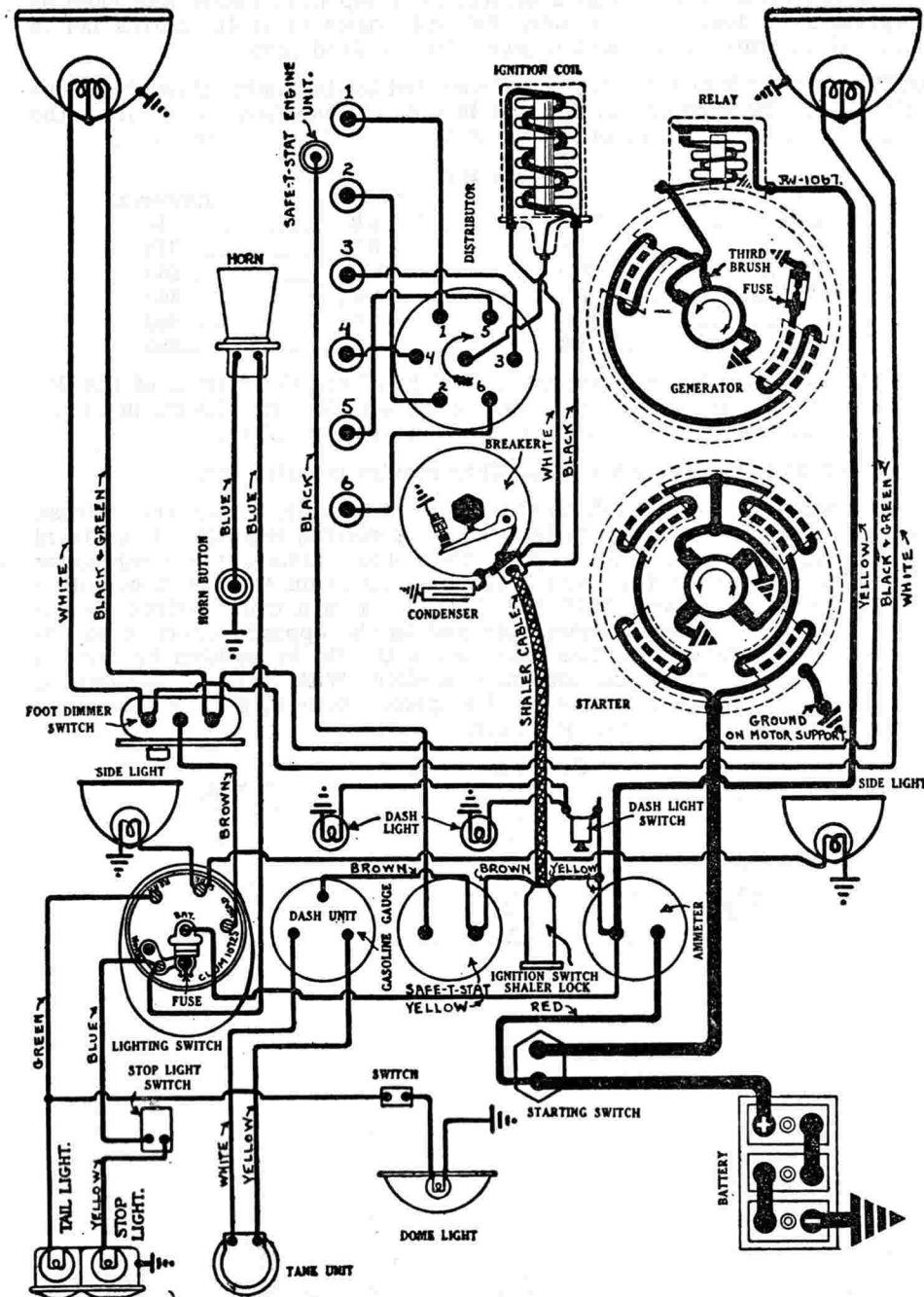
**Firing Order:**—The firing order is 1-5-3-6-2-4.

**Spark Plugs:**—Spark plugs are 7/8-18 S.A.E. Standard. Gaps are .025 inch.

**VALVE TIMING:—Specifications:—**Head diameter, 1 $\frac{5}{8}$  inches. Stem diameter, .371 inch. Stem length, 5 $\frac{1}{4}$  inches. Valve lift, 5/16 inch. Spring pressure, 85 pounds (valve open—spring length, 2 inches). Tappet clearance, .006 inch (hot). Valve stem guides are removable. Valves with oversize stems are not made.

**Timing:**—Inlet valves open 4 degrees after top dead center and close 46 degrees after lower dead center. Exhaust valves open 41 degrees before lower dead center and close 1 degree after top dead center.

**STARTER:—Model MZ-4001.** Starter is connected to the engine through a Bendix drive. The direction of rotation is counter-clockwise, viewed from the commutator end. Starter brush tension is 2½-3 pounds each.



# DURANT

## MODEL 66 (1929) SERIAL NUMBERS 1000 UP AUTO-LITE GENERATING, STARTING SYSTEM AUTO-LITE IGNITION

### Starter Data

Torque	R.P.M.	Volts	Amperes
0 lb. ft.	Free	6.0	50
1.5 "	1800	5.2	150
2.5 "	1325	5.0	200
5.0 "	740	4.5	300
7.6 "	220	4.0	400
12.2 "	Lock	4.0	550

**Mounting:**—Starter is cradle mounted at right of engine in front of the fly-wheel. To remove starter, disconnect cable and loosen bolts on mounting clamp band. Then pull starter forward and lift from place.

**Oiling:**—Starter bearings are oilless. They require no attention.

**GENERATOR:**—Model GAL-4104. The direction of rotation is counter-clockwise, viewed from the commutator end. Generator current regulation is by third brush shunt field. To adjust generator output, remove the commutator cover band and shift the third brush by tapping on the brush mounting stud with a screwdriver. Shift the third brush in a counter-clockwise direction to increase the charging rate and in the opposite direction to decrease the charging rate. The third brush is held in position by friction between the mounting stud and the end plate. With standard car setting, the maximum charging rate is 16-17 amperes (cold) at 8 volts reached at 2075 R.P.M. or 24.2-28.4 miles per hour.

### Generator Data

Amperes	Volts	R.P.M.
2	6.4	675
6	6.9	835
10	7.3	1025
14	7.65	1275
17.2	8.0	2075
14	7.65	2925

Brush spring tension is 24-32 ounces. Generator draws 4.7-5.7 amperes at 6 volts, motoring. Shunt field current is 4.2 amperes at 6 volts.

**Mounting:**—Generator is flange mounted at right of engine on rear of timing chain case. To remove generator, disconnect all ignition wiring or remove coil and distributor. Then take off chain inspection cover on front of chain case and remove nut on generator shaft holding sprocket in place. Then remove flange mounting cap screws and pull generator to the rear. Tie up the chain and do not crank engine with generator out.

**Oiling:**—Put 4 or 5 drops of light engine oil in the oiler on the commutator end of the generator every week or each 250 miles. Every 5000 miles remove the oil well and clean out old oil and grease. Refill with light oil. The drive end bearing is oiled from the chain case.

**RELAY:**—Model CB-4014. Relay is mounted on the generator. Relay closes at 675 R.P.M. when the generator voltage reaches 7-7.5 volts and opens with a discharge current of 0-2.5 amperes. Charging current at closing of contacts is approximately 2 amperes. Relay contacts separate .025-.035 inch. Air gap is .010-.030 inch with contacts closed.

**LIGHTING:**—Clum Switch Model 10725. Lighting switch is mounted on instrument panel. Double filament headlights using the second 21 cp. filament instead of dimmers are standard equipment. Headlights are 6-8 volt, 21-21 cp. D.C. Mazda 1110. Stop light is 6-8 volt, 15 cp. S.C. Mazda 87. Side, dash, tail and dome lights are each 6-8 volt, 3 cp. S.C. Mazda 63.

**FUSES:**—Generator field fuse is 5 ampere capacity. Lighting fuse on switch is 20 ampere capacity.



# ESSEX

## CHALLENGER MODEL (1929) SERIAL NUMBERS 928658 UP PRODUCTION STARTED JANUARY 1, 1929 AUTO-LITE GENERATING, STARTING SYSTEM AUTO-LITE IGNITION

**BATTERY:**—Exide, Type 3-XI-13-IG, 6 volt. The negative (—) terminal is grounded. Starting capacity (20 minute rate) is 98 amperes for 20 minutes. Lighting capacity (5 ampere rate) is 5 amperes for 17 hours. Battery is mounted under the left front seat.

**IGNITION:**—Coil Model IG-4065. Coil is mounted on the cylinder head at the front of the engine. Ignition current is 1.5-3 amperes at 6 volts with engine running and 3.4-5 amperes at 6 volts with engine stopped.

**Distributor Model IGB-4022.** Breaker contacts separate .020-.024 inch. Set contact gap by loosening lock nut on stationary contact mounting stud and turning up stud until correct gap is secured with breaker arm on lobe of cam. Breaker arm spring tension is 16-20 ounces. Distributor is full automatic. Automatic advance begins at 800 R.P.M. of engine. Maximum automatic advance is 20 degrees (engine) reached at 4000 R.P.M. An Electrolock ignition switch is standard equipment.

**Mounting:**—Distributor is mounted on the accessory shaft housing at the right of the engine. To remove distributor, disconnect Electrolock at the dash and remove the distributor head with cables intact. Then take off the nut on the taper pin in support housing and lift distributor and Electrolock assembly from place. The Electrolock can then be removed by taking off the nut on the terminal stud inside the distributor housing and withdrawing the Electrolock cable, ferrule and stud from the distributor housing.

**Oiling:**—Put 6 or 8 drops of light engine oil in the oiler on the side of the distributor each 500 miles of operation. Every 250 miles put one drop of oil on the breaker arm pivot pin. Every 5000 miles remove the distributor head and rotor and put a small bit of vaseline on the face of the breaker cam.

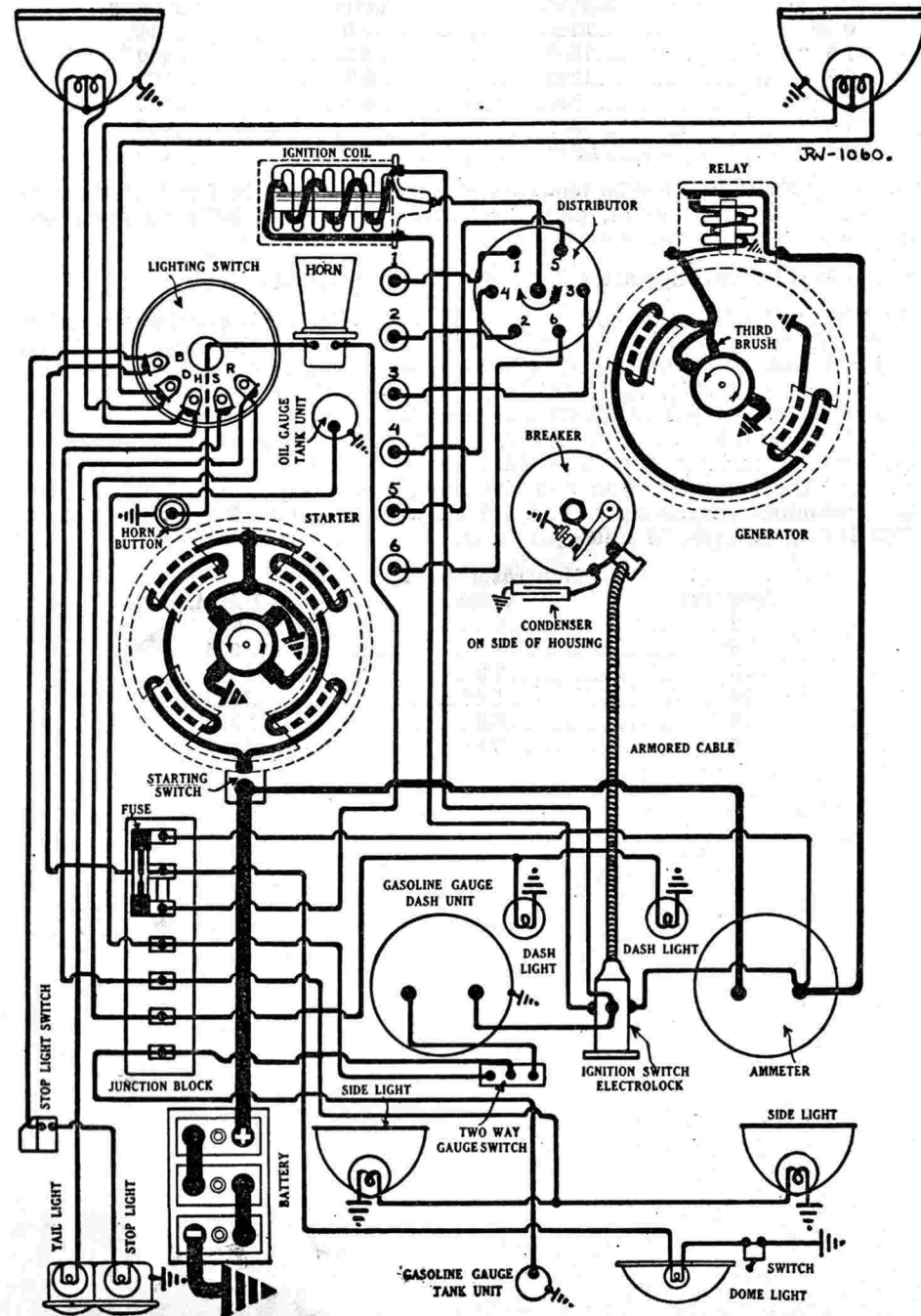
**Timing:**—Breaker contacts begin to open when the piston entering power stroke reaches top dead center with the breaker assembly fully retarded. To set timing, crank engine over until piston No. 1 enters compression stroke (the up stroke with both valves closed). Carefully turn engine over until the vertical mark on the flywheel which immediately precedes the top dead center mark 'DC1-6' coincides with the lower edge of the square inspection hole in the flywheel housing at the rear of the engine on the right side. Then loosen nut on clamp bolt on side of distributor shaft housing and rotate distributor until contacts begin to open. Tighten the clamp bolt and connect the segment opposite the rotor to the spark plug in cylinder No. 1. Connect the remaining spark plugs in order clockwise around the distributor head.

**Firing Order:**—The firing order is 1-5-3-6-2-4.

**Spark Plugs:**—Spark plugs are 18MM. Metric. Gaps are .025 inch.

**VALVE TIMING:**—Head diameter, 1 $\frac{3}{8}$  inches. Stem diameter, 5/16 inch. Stem length, 5 1/32 inches. Valve lift, 5/16 inch (inlet), 21/64 inch (exhaust). Spring pressure, 50 pounds. Tappet clearance, .003-.005 inch (inlet) and .005-.007 inch (exhaust). Valve stem guides are removable. Valves with oversize stems are not made.

**Timing:**—Inlet valves open 7 degrees after top dead center with the piston 1/64 inch down on inlet stroke. Tappet clearance must be .006 inch.



# ESSEX

## CHALLENGER MODEL (1929) SERIAL NUMBERS 928658 UP PRODUCTION STARTED JANUARY 1, 1929 AUTO-LITE GENERATING, STARTING SYSTEM AUTO-LITE IGNITION

**STARTER:—Model MZ-4012.** Starter is connected to the engine through an in-board Bendix drive. The direction of rotation is counter-clockwise, viewed from the commutator end. Brush spring tension is  $2\frac{1}{2}$  pounds.

Starter Data			
Torque	R.P.M.	Volts	Amperes
0 lb. ft.	Free	6	50
1.5 "	1800	5.2	150
2.5 "	1325	5.0	200
5.0 "	740	4.5	300
7.6 "	220	4.0	400
12.2 "	Lock	4.0	550

**Mounting:—**Starter is mounted by special flange at left of engine on forward side of flywheel housing. To remove starter, disconnect cable and lead to junction block. Then remove three flange mounting cap screws, pull starter forward to clear Bendix and lift from place.

**Oiling:—**Starter bearings are oilless. They require no attention.

**GENERATOR:—Model GAM-4101.** The direction of rotation is counter-clockwise, viewed from the commutator end. Generator current regulation is by third brush shunt field. To adjust generator output, remove the commutator cover band and shift the third brush by tapping on the mounting stud with a screwdriver. Shift the third brush in a counter-clockwise direction to increase the charging rate and in the opposite direction to decrease the charging rate. The brush is held in position by friction between the mounting stud and the end plate. With standard car setting, the maximum charging rate is 15 amperes at 8 volts reached at 1350 R.P.M. or 25 miles per hour.

Generator Data		
Amperes	Volts	R.P.M.
0	6.5	620
2	6.9	710
5	7.1	830
10	7.8	1090
14	7.9	1490
15	8.0	1900

Motoring, generator draws 5.5 amperes at 6 volts. Shunt field current is 6.5 amperes at 6 volts. Brush spring tension is  $1\frac{1}{4}$ - $1\frac{1}{2}$  pounds.

**Mounting:—**Generator is cradle mounted at right of engine. To remove generator, disconnect generator lead and drive coupling and loosen mounting clamp band. Lift generator from place.

**Oiling:—**Put 4 or 5 drops of light engine oil in each of the generator bearing oilers every two weeks or each 500 miles of operation.

**RELAY:—Model CB-4015.** Relay is mounted on the generator end plate. Relay closes at 550 R.P.M. when the generator voltage reaches 7-7.5 volts and opens with a discharge current of 0-2.5 amperes. Charging current at closing of contacts is approximately 2 amperes. Relay contact gap is .025-.035 inch. Air gap is .010-.030 inch with contacts closed.

**LIGHTING:—Clum Switch Model 10717.** Lighting switch is mounted at base of steering column. Double filament headlights using a second 21 cp. filament instead of dimmers are standard equipment. Headlights are 6-8 volt, 21-21 cp. D.C. Mazda 1110. Stop light is 6-8 volt, 15 cp. S.C. Mazda 87. Side, dash and tail lights are each 6-8 volt, 3 cp. S.C. Mazda 63.

**FUSES:—**Lighting fuse on junction block on dash is 20 ampere capacity.

# FORD

## MODEL A (1929)

### FORD GENERATING, STARTING SYSTEM FORD IGNITION

**BATTERY:**—Ford, 13 plates, 6 volt, 80 ampere hour. The positive (+) terminal is grounded. Starting capacity (20 minute rate) is 98 amperes for 20 minutes. Lighting capacity (5 ampere rate) is 5 amperes for 16 hours. Battery is mounted under the front floor boards on the left frame member. Battery assembly is now standard. The first 100,000 cars used a battery with reversed terminals. Batteries cannot be interchanged unless ground strap is modified.

**IGNITION:**—Ignition coil is mounted on the dash directly above junction box. Ignition current is 6 amperes at 7 volts with engine running and 4.2 amperes at 6 volts with engine stopped.

Breaker contacts separate .018-.022 inch. Adjust contact opening by loosening lock screw on stationary contact mounting bracket and turning up stud until correct gap is obtained with breaker arm on lobe of cam. Resurface contacts when necessary with a fine flat contact file or on a medium hard oilstone. Breaker arm spring tension is 14-20 ounces. Distributor is full manual type. Maximum manual advance is 20 degrees.

**Mounting:**—Distributor is mounted on the cylinder head between cylinders two and three. To remove breaker plate, disconnect cable in center of cap and four spring connectors to spark plugs, loosen clips and take off cap and terminal assembly. Then loosen lock screw in center of breaker cam and remove cam. Disconnect manual advance rod and turn breaker plate until projections on plate line up with grooves in housing. Then lift breaker plate straight up. The distributor housing can be removed if necessary by loosening the lock nut and backing out the mounting stud on the right side of the engine block directly opposite the distributor mounting. The ignition switch is an Electrolock Type 6-A which is permanently connected to the distributor housing by an armored cable. The switch must be removed from the instrument board when the distributor housing is taken off the engine.

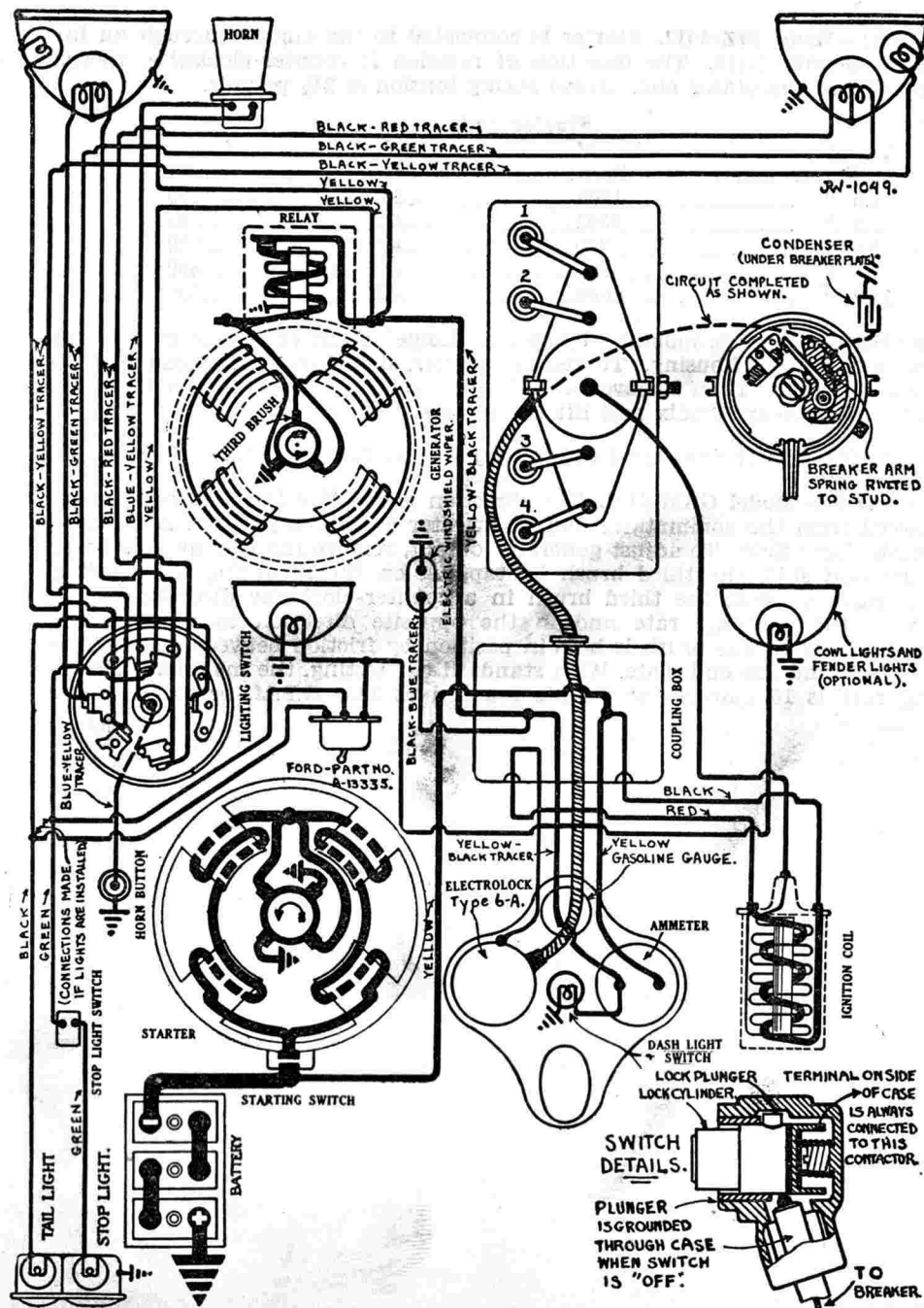
**Oiling:**—Put a few drops of light engine oil in the oiler on the side of the distributor every month or each 1000 miles. At the same time put a small bit of vaseline on the face of the breaker cam.

**Timing:**—Breaker contacts begin to separate when the piston entering power stroke reaches top dead center with the manual spark control lever in the fully retarded position. To set timing, crank engine over until piston No. 1 enters compression stroke (the up stroke with both valves closed). Fully retard spark lever. Take out the timing pin which is screwed in the face of the gear case directly over the camshaft gear and reverse the pin in the hole. Then continue to crank the engine slowly, pressing on the pin meanwhile until the pin drops into the hole in the face of the gear. This is the top dead center position for piston No. 1. Then remove distributor cap and rotor and loosen the lock screw in the center of the cam. Replace rotor and turn cam until rotor button is directly opposite No. 1 segment (right hand segment on front of distributor housing facing radiator). Remove rotor and adjust cam until contacts are just beginning to open. Tighten the lock screw. Be careful to withdraw timing pin and screw it firmly in place in original position before engine is run.

**Firing Order:**—The firing order is 1-2-4-3. Number one cylinder nearest the radiator.

**Spark Plugs:**—Spark plugs are 7/8-18 S.A.E. Standard. Gaps are .025 inch.

**VALVE TIMING:**—INLET VALVES:—Head diameter, 1 1/2 inches. Stem diameter, 5/16 inch. Stem length, 5 21/32 inches. Valve lift, .287 inch. Spring pressure,





# FORD

MODEL A (1929)

## FORD GENERATING, STARTING SYSTEM

### FORD IGNITION

36 pounds. Tappet clearance, .015 inch. Inlet valves open 7 degrees before top dead center and close 48 degrees after lower dead center.

**EXHAUST VALVES:**—Head diameter, 1½ inches. Stem diameter, 5/16 inch. Stem length, 5 21/32 inches. Valve lift, .287 inch. Spring pressure, 36 pounds. Tappet clearance, .015 inch. Exhaust valves open 51 degrees before lower dead center and close 1 degree after top dead center. Valve stem guides are removable. Oversize valves are not made.

**STARTER:**—Starter is connected to the engine through an inboard Bendix drive. The direction of rotation is counter-clockwise, viewed from the commutator end. Brush spring tension is two pounds. Starter switch is mounted on the field frame. The new type switch has a flat spring and if it is installed on an old starter the starter terminal must be dressed down flat to a height of 11/32-¾ inch. The starter cable terminal has been redesigned and now extends straight out from the cable. The old cable assembly can be used with the new switch by bending the terminal from its right angle position.

Starter Data			
Torque	R.P.M.	Volts	Amperes
0 lb. ft.	2700	6	50
14 "	Lock	3.75	560

**Note:**—The Bendix drive has been used since October 1, 1928. Previous to that date a special Abell drive was used. The old type starter can be reoperated to take a special Bendix "Service Starter Drive" Ford Part No. A-11350-DR. Under no conditions should the old Model T Bendix drive be installed on these starters. The new Bendix drive can be installed on both ball bearing and plain bearing starters used on cars under 492511. Cars after 492511 have the standard Bendix drive. To install drive, disassemble starter and press off ball bearing on drive end. Then place armature in lathe, check shaft and correct if bent and turn down the large portion of the shaft to a diameter .494-.498 inch to a point 4½ inches from the center of the pilot screw hole in the armature shaft. Be sure to leave a radius of 1/32-¼ inch at the end of the cut. If a sharp shoulder is left or the shaft is undercut at this point, the armature shaft will be weakened and will break at this point in service. When the operation is completed, the turned down portion of the shaft should be the same diameter as the original end of the shaft and should merge with it without any shoulder or roughness. Polish the shaft with a fine file in the lathe. Then turn out the hole in the bearing retainer plate to an inside diameter of 1 1/16 inches to clear the Bendix drive stop nut. In reoperating the plain bearing starter, the face or boss of the bearing in the end plate must be cut back a distance of 9/64 inch, making the bearing 1 1/16 inches long to clear the Bendix assembly. When the Bendix drive is assembled the stop nut should be against the shoulder on

the shaft but the spring should not be compressed more than 1/16 inch.

**Mounting:**—Starter is flange mounted at left of engine on forward side of flywheel housing. To remove starter, disconnect cable and pedal rod or remove starter switch (this is the quickest method). Then remove flange mounting cap screws and pull starter forward. Lift starter from place. In some cases shims were used between the starter flange and the flywheel case to secure proper clearance of 1/32- 1/16 inch between the flywheel and the pinion on the old type starter with Abell drive. These shims should not be used with the starter equipped with Bendix drive.

**Oiling:**—Starter bearings are oilless. They require no attention.

**GENERATOR:**—The generator has been modified and a new type four pole three brush generator is now being used. The direction of rotation is counter-clockwise, viewed from the commutator end. Generator current regulation is by third brush shunt field. To adjust generator output, remove the commutator cover band and shift the third brush by hand. Shift the third brush in a counter-clockwise direction to increase the charging rate and in the opposite direction to decrease the charging rate. The brush is held in position by the spring tension of the third brush holder. For normal driving during summer months the generator charging rate should be set at 6 amperes.

**Mounting:**—Generator is mounted at the left of the engine and is belt driven by the fan belt. To remove generator, disconnect the lead and loosen the clamp bolt on the adjustment bracket. Swing generator toward the engine and slip off drive belt. Then remove bolt in mounting lug under the generator and lift generator from place.

**Oiling:**—Put 2 or 3 drops of light engine oil in the oiler at each end of the generator every month or each 1000 miles of operation.

**RELAY:**—Relay is mounted on the generator.

**LIGHTING:**—The old lighting switch Part No. A-11664 (contact) A-11658 (Switch Body) has been superseded by a new switch Part No. A-11654-B but the old type will be furnished for replacement of old units. Switch is mounted on the lower end of the steering column. Headlights are now "Twolite" using 21 cp. double filament bulbs. Two types are used, Ford Part No. A-13005-C (with dimmer bulbs) and Part No. A-13005-D (for use with fender lights or cowl lights). Headlights are 6-8 volt, 21-21 cp. D.C. Mazda 1110 or 6-8 volt, 32-21 cp. D.C. Mazda "Ford" type (for use in states where laws permit). Stop light is 6-8 volt, 21 cp. S.C. Mazda 1129. Dimmer lights, fender lights for parking and cowl lights are 6-8 volt, 3 cp. S.C. Mazda 63. Dash and tail lights are each 6-8 volt, 3 cp. S.C. Mazda 63.

# FRANKLIN

MODEL 130 (1929) SERIAL NUMBERS 183,000 UP  
PRODUCTION STARTED JANUARY 5, 1929  
DELCO-REMY GENERATING, STARTING SYSTEM  
DELCO-REMY IGNITION

**BATTERY:**—U.S.L. Type XX-17X-6, 6 volt. The positive (+) terminal is grounded. Starting capacity (20 minute rate) is 137 amperes for 20 minutes. Lighting capacity (5 ampere rate) is 5 amperes for 24.2 hours. Battery is mounted under the front seat on the right side.

**IGNITION:**—Coil Model 528-W. Coil is mounted on the back of the instrument board with the ignition switch which is in the base of the coil extending through to the face of the instrument panel. Ignition current is  $1\frac{3}{4}$  ampere at 6 volts with engine running and 4 amperes at 6 volts with engine stopped.

**Distributor Model 640-T.** Breaker contacts separate .018-.024 inch. To set contact gap, loosen lock screw on stationary contact mounting plate directly behind the breaker arm and turn the eccentric adjusting screw until the correct gap is secured with the breaker arm on the lobe of the cam. Resurface contacts when necessary with a fine flat contact file or on a medium hard oilstone. Breaker arm spring tension is 17-21 ounces. Distributor is full automatic with an auxiliary retard controlled by a button on the dash to prevent engine laboring and to provide retard for starting. Automatic advance begins at 400 R.P.M. (engine). Maximum automatic advance is 39 degrees reached at 2400 R.P.M. of engine.

**Mounting:**—Distributor is mounted on the crank case at the right of the engine. To remove distributor, disconnect primary lead and manual advance rod and remove distributor head with cables intact. Then loosen clamp screw and lift distributor from place.

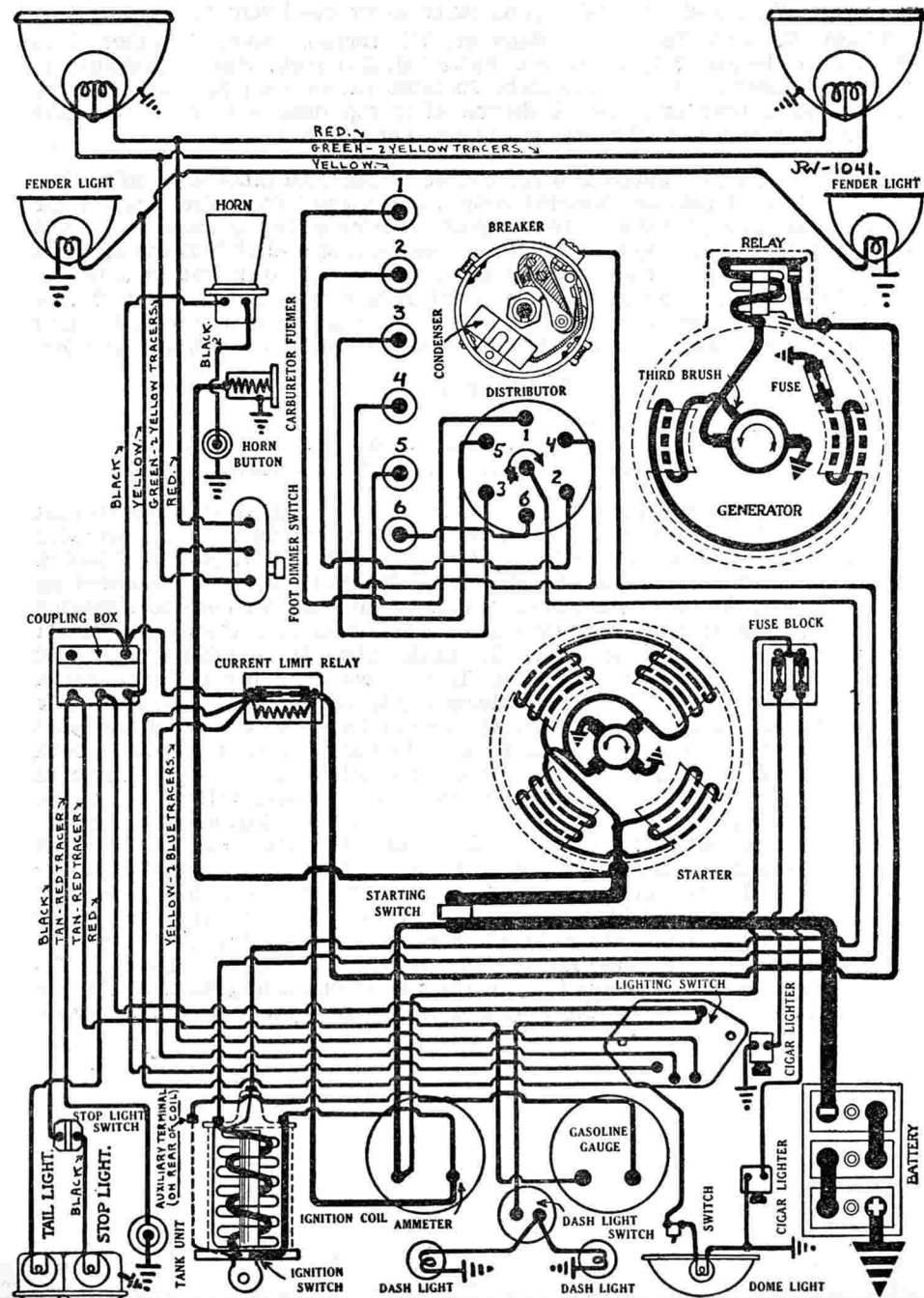
**Oiling:**—Fill the grease cup on the side of the distributor shaft with medium cup grease and turn down one turn every 2000 miles. Remove distributor head and rotor and put a few drops of light engine oil in the wick oiler in the center of the shaft every 1000 miles. At the same time put one drop of oil on the breaker arm pivot pin and put a small bit of vaseline on the face of the breaker cam.

**Timing:**—Breaker contacts begin to separate when the piston entering power stroke reaches a position  $1\frac{5}{8}$  inches (on the fanwheel) before top dead center with the spark control button in the fully advanced position or pushed all the way in toward the dash and the distributor housing turned counter-clockwise as far as possible. To set timing, crank engine over until piston No. 1 enters compression stroke (the upstroke with both valves closed). Place spark control button in the fully advanced position. Continue to crank engine until the triangular mark on the rim of the fanwheel at the front of the engine (visible after the upper air housing is removed) is  $1\frac{5}{8}$  inches before or to the right of the dead center line on the inside of the fanwheel housing. Then loosen advance arm clamp screw and rotate the distributor housing until contacts begin to open. Tighten the clamp screw and connect the terminal directly opposite the rotor to the spark plug in cylinder No. 1. Connect the remaining spark plugs in order 4-2-6-3-5 clockwise around the distributor.

**Firing Order:**—The firing order is 1-4-2-6-3-5.

**Spark Plugs:**—Spark plugs are 18 MM. Metric Champion. Gaps are .025 inch.

**VALVE TIMING:**—INLET VALVES:—Head diameter, 1.567 inches. Stem diameter, .3385 inch. Stem length,  $4\frac{3}{8}$  inches. Valve lift,  $\frac{5}{32}$  inch. Spring pressure, 32-34 pounds. Tappet clearance, .012 inch (cold—running clearance and .031 inch—clearance for valve timing). To set valves, first adjust tappet



# FRANKLIN

MODEL 130 (1929) SERIAL NUMBERS 183,000 UP  
PRODUCTION STARTED JANUARY 5, 1929  
DELCO-REMY GENERATING, STARTING SYSTEM  
DELCO-REMY IGNITION

clearance of No. 1 inlet valve to .031 inch. Then crank engine over until triangular mark on fanwheel is opposite top dead center line on fanwheel housing. Inlet valve should open at this point. After setting timing, adjust tappet clearance of No. 1 inlet valve to .012 inch running clearance. With .031 inch tappet clearance, inlet valves open at top dead center and close 57 degrees after lower dead center.

**EXHAUST VALVES:**—Head diameter, 1½ inches. Stem diameter, .3385 inch. Stem length, 4 33/64 inches. Valve lift, 9/64 inch. Spring pressure, 32-34 pounds. Tappet clearance, .012 inch (cold). Exhaust valves open 43½ degrees before lower dead center and close 25 degrees after top dead center. Valve stem guides are removable. Oversize valves are not made.

**STARTER:**—Model 723-C. Starter is connected to the engine through reduction gears and an inboard Bendix drive. The direction of rotation of the armature shaft is clockwise, viewed from the commutator end. Starter switch is Model 404-W.. Brush spring tension is 24-28 ounces. Starter cranks the engine at 125 R.P.M. drawing 145 amperes at 5.1 volts.

Starter Data			
Torque	R.P.M.	Volts	Amperes
0 lb. ft. ....	3500 .....	5 .....	70 .....
22 " .....	Lock .....	3 .....	600 .....

**Mounting:**—Starter is flange mounted at right of engine on forward side of flywheel housing. To remove starter, disconnect cable and remove 3 flange mounting cap screws. Then pull starter forward and lift from place.

**Oiling:**—Put 8 or 10 drops of light engine oil in each of the starter oilers every month or each 1000 miles. Once each year remove the grease plug in the reduction gear case and repack the gears with graphite grease.

**GENERATOR:**—Model 945-Y. The direction of rotation is counter-clockwise, viewed from the commutator end. Generator current regulation is by third brush shunt field. To adjust the generator output, loosen the small round headed screw on the generator end plate and remove the commutator cover band. Then shift the third brush in a counter-clockwise direction to increase the charging rate and in the opposite direction to decrease the charging rate. Tighten the screw after making the adjustment. With standard car setting, maximum charging rate is 18 amperes (cold) at 8 volts reached at 1700 R.P.M. or 27 miles per hour.

Generator Data					
Cold Test			Hot Test		
Amperes	Volts	R.P.M.	Amperes	Volts	R.P.M.
16-18 .....	8.82 .....	1650 .....	11-13 .....	7.5-7.8 .....	1800 .....

Stalled generator draws 30 amperes at 6 volts. Shunt field current 2.8-3.5 amperes at 6 volts. Brush spring tension is 14-18 ounces. A five ampere field fuse is mounted on the end plate and is accessible after removing the plug directly over the fuse mounting.

**Mounting:**—Generator is flange mounted at right of engine on rear of timing chain case. To remove generator, disconnect lead and remove the two flange mounting cap screws and the nut on the lower stud. Do not disturb the nut on the forward end of the stud. Then pull generator to the rear and lift from place.

**Adjustment of Timing Chain:**—Timing chain is adjusted by shifting generator. Loosen the two flange mounting cap screws and the nut on the front side of the flange at the bottom. Loosen the adjusting screw lock nut. Remove the chain inspection hole plug, and insert a hook made of a stiff wire bent at right angles ½ inch from the end. This should be worked under the chain. To tighten the chain, screw generator adjusting screw out until there is ¾ to ½ inch up and down play in the wire. Tighten the lock nut on the adjusting screw and the cap screws and nut holding the generator.

**Oiling:**—Put 8 or 10 drops of light engine oil in the oiler on the commutator end of the generator every month or each 1000 miles. The drive end bearing is in the engine and is oiled from the chain case.

**RELAY:**—Model 265-B. Relay is mounted on the generator. Relay contacts close at 570 R.P.M. or 8 M.P.H. when the generator voltage reaches 7.5 volts and open at 510 R.P.M. or 7 M.P.H. with a discharge current of 1-2.5 amperes. Contacts separate .015-.025 inch. Air gap is .014 inch with contacts closed. Charging current at closing of contacts is approximately 2 amperes.

**LIGHTING:**—Soreng Manegold Switch Model 5100. Delco-Remy Dimmer Switch Model 465-C. Lighting switch is mounted on the instrument panel. Double filament headlights are used controlled by the dimmer switch on the toe-board. Headlights are 6-8 volt, 21-21 cp. D.C. Mazda 1110. Stop light is 6-8 volt, 15 cp. Mazda 87. Side, dash, dome and tail lights are each 6-8 volt, 3 cp. S.C. Mazda 63.

**CURRENT LIMIT RELAY:**—This device is connected in the lighting lines. It consists of a fuse block mounted on the dash with a fixed resistance connected across a 20 ampere capacity fuse. When the current of the lighting lines reaches 20 amperes the fuse will blow out causing the current to flow through the resistance. The resistance will limit the current flow to 30 amperes.

**FUSES:**—Generator field fuse mounted on the generator end plate is 5 ampere capacity. Lighting fuse mounted on current limit relay is 20 ampere capacity.



# FRANKLIN

MODEL 135 (1929) SERIAL NUMBERS 183,000 UP

MODEL 137 (1929) SERIAL NUMBERS 183,000 UP

PRODUCTION STARTED JANUARY 5, 1929

DELCO-REMY GENERATING, STARTING SYSTEM

DELCO-REMY IGNITION

**BATTERY:**—U.S.L. Type XY-19X-6, 6 volt. The positive (+) terminal is grounded. Starting capacity (20 minute rate) is 153 amperes for 20 minutes. Lighting capacity (5 ampere rate) is 5 amperes for 27.6 hours. Battery is mounted under the front seat on the right side.

**IGNITION:**—Coil Model 528-X. Coil is mounted on the back of the instrument board with the ignition switch which is in the base of the coil extending through to the face of the instrument panel. Ignition current is  $1\frac{3}{4}$  amperes at 6 volts with engine running and 4 amperes at 6 volts with engine stopped.

**Distributor Model 640-T.** Breaker contacts separate .018-.024 inch. Set contact gap by loosening lock screw on stationary contact mounting plate directly behind the breaker arm and turning eccentric adjusting screw until correct gap is secured with breaker arm on lobe of cam. Resurface contacts when necessary with a fine flat contact file or on a medium hard oilstone. Distributor is full automatic with an auxiliary retard controlled by a button on the dash to prevent engine laboring under load and to provide retard for starting. Automatic advance begins at 400 R.P.M. of engine. Maximum automatic advance is 39 degrees reached at 2400 R.P.M. of engine. Breaker arm spring tension is 17-21 ounces.

**Mounting:**—Distributor is mounted on crankcase at right of engine. To remove distributor, disconnect primary lead and manual advance rod and remove distributor head with cables intact. Then loosen advance arm clamp screw and lift distributor from place.

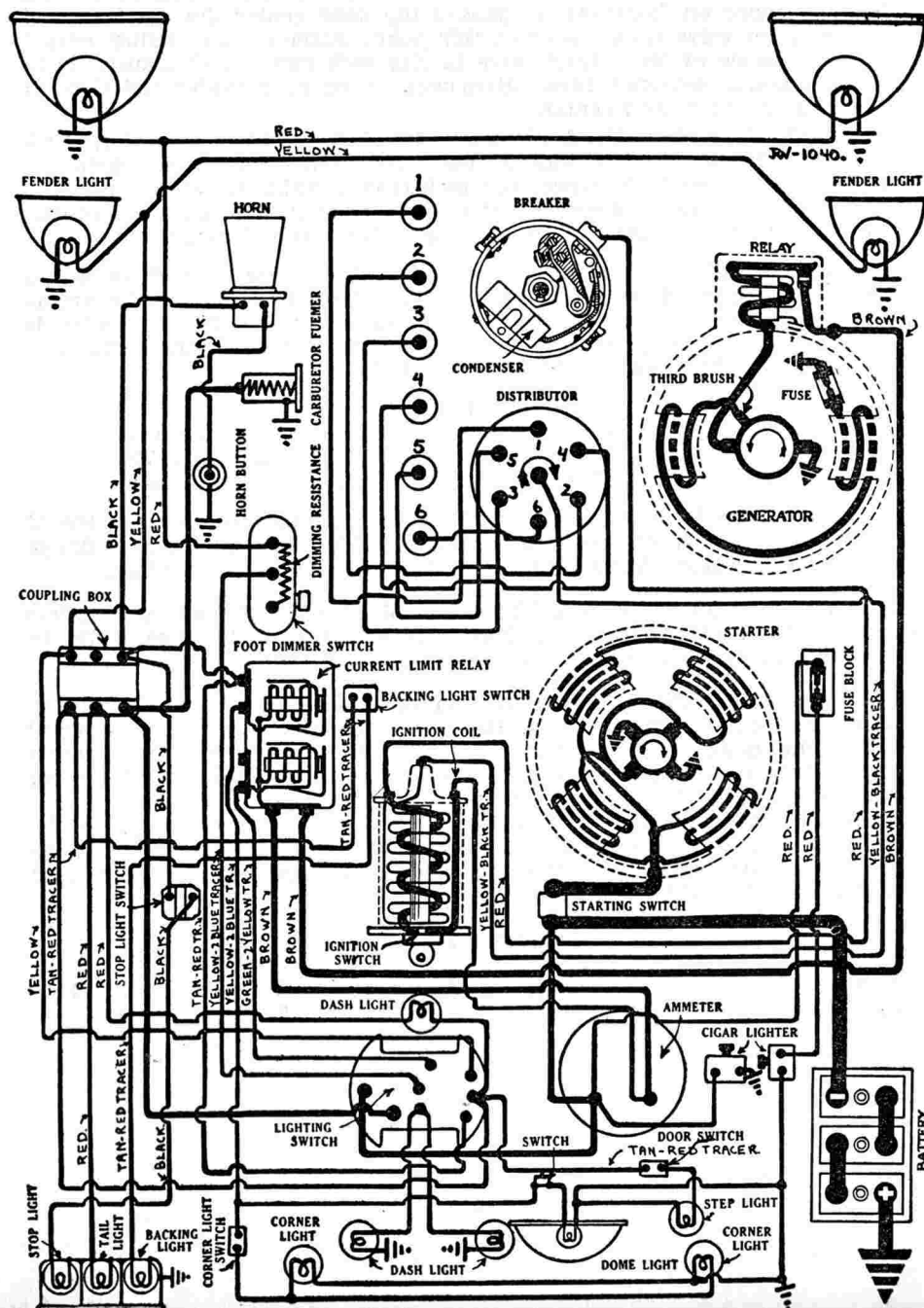
**Oiling:**—Fill the grease cup on the side of the shaft with medium cup grease and turn down one turn every 2000 miles. Every 1000 miles, remove the distributor head and rotor and put a few drops of light engine oil in the wick oiler in the center of the shaft. At the same time put a small bit of vaseline on the face of the breaker cam.

**Timing:**—Breaker contacts begin to separate when the piston entering power stroke reaches a position  $1\frac{5}{8}$  inches (on the fanwheel) before top dead center with the spark control button fully advanced or pushed in toward the dash as far as possible. To set timing, crank engine over until piston No. 1 enters compression stroke (the upstroke with both valves closed). Place spark control button in the fully advanced position and make certain that the distributor is rotated counter-clockwise as far as possible. Then continue to crank engine over until the triangular mark on the fanwheel rim (visible after the upper air housing is removed) is  $1\frac{5}{8}$  inches before or to the right of the vertical dead center mark on the inside of the fanwheel housing. Loosen advance arm clamp screw and rotate distributor housing until contacts begin to open. Tighten the clamp screw and connect the terminal directly opposite the rotor to the spark plug in cylinder No. 1. Connect the remaining spark plugs in order 4-2-6-3-5 clockwise around the distributor head.

**Firing Order:**—The firing order is 1-4-2-6-3-5.

**Spark Plugs:**—Spark plugs are Metric 18 MM. Champion. Gaps are .025 inch.

**VALVE TIMING:**—INLET VALVES:—Head diameter, 1.63 inches. Stem diameter, .3725 inch. Stem length,  $4\frac{1}{2}$  inches. Valve lift,  $5/32$  inch. Spring pressure, 40-42 pounds. Tappet clearance, .012 inch (cold) running clearance and .031 inch for valve timing. Inlet valves open at top dead center (with .031 inch tappet clearance) and close 57 degrees after lower dead center.



# FRANKLIN

MODEL 135 (1929) SERIAL NUMBERS 183,000 UP  
MODEL 137 (1929) SERIAL NUMBERS 183,000 UP  
PRODUCTION STARTED JANUARY 5, 1929  
DELCO-REMY GENERATING, STARTING SYSTEM  
DELCO-REMY IGNITION

**EXHAUST VALVES:**—Head diameter, 1.63 inches. Stem diameter, .3725 inch. Stem length, 4 $\frac{5}{8}$  inches. Valve lift, 9/64 inch. Spring pressure, 40-42 pounds. Tappet clearance, .012 inch. Exhaust valves open 43 $\frac{1}{2}$  degrees before lower dead center and close 25 degrees after top dead center. Valve stem guides are removable. Oversize valves are not made.

**Valve Timing:**—To set valves, first set tappet clearance of piston No. 1 inlet valve at .031 inch. Then crank engine over until fanwheel triangular mark is opposite the vertical dead center mark on the inside of the fanwheel housing. Inlet valve for cylinder No. 1 should open at this point. After setting valve timing, reset inlet valve tappet clearance to .012 inch running clearance.

**STARTER:**—Model 723-C. Starter is connected to the engine through a set of reduction gears and an inboard Bendix drive. The direction of rotation (armature shaft) is clockwise, viewed from the commutator end. Starter switch is Model 404-W. Brush spring tension is 24-28 ounces. Starter cranks the engine at 125 R.P.M. drawing 145 amperes at 5.1 volts.

Starter Data			
Torque	R.P.M.	Volts	Amperes
0 lb. ft.	3500	5	70
22 "	Lock	3	600

**Mounting:**—Starter is flange mounted at right of engine on forward side of flywheel housing. To remove starter, disconnect cable and remove 3 flange mounting cap screws. Then pull starter forward and lift from place.

**Oiling:**—Put 8 or 10 drops of light engine oil in each of the starter bearing oilers every month or each 1000 miles. Once each year remove the plug in the reduction gear case and repack the gears with graphite grease.

**GENERATOR:**—Model 945-Y. The direction of rotation is counter-clockwise, viewed from the commutator end. Generator current regulation is by third brush shunt field. To adjust generator output, loosen the small round headed screw on the generator end plate and remove the commutator cover band. Then shift the third brush by hand in a counter-clockwise direction to increase the charging rate and in the opposite direction to decrease the charging rate. Tighten the screw after making the adjustment. With standard car setting, the maximum charging rate is 18 amperes (cold) at 8 volts reached at 1700 R.P.M. or 27 miles per hour.

Generator Data					
Cold Test			Hot Test		
Amperes	Volts	R.P.M.	Amperes	Volts	R.P.M.
16-18	8.82	1650	11-13	7.5-7.8	1800

Stalled, generator draws 30 amperes at 6 volts. Shunt field current is

2.8-3.5 amperes at 6 volts. Brush spring tension is 14-18 ounces. A 5 ampere field fuse mounted on the generator end plate is accessible after the plug over the fuse mounting is removed.

**Mounting:**—Generator is flange mounted on the right of the engine at the rear of the timing chain case. To remove generator, disconnect the lead and remove the two flange mounting cap screws and the nut on the lower stud. Do not disturb the nut on the forward end of the stud. Then pull generator to the rear and lift from place.

**Adjustment of Timing Chain:**—Timing chain is adjusted by shifting generator. Loosen the two flange mounting cap screws and the nut on the front side of the flange at the bottom. Loosen the adjusting screw lock nut. Remove the chain inspection hole plug and insert a hook made of a stiff wire bent at right angles  $\frac{1}{2}$  inch from the end. This should be worked under chain. To tighten the chain, screw out the generator adjusting screw until there is  $\frac{3}{8}$  inch to  $\frac{1}{2}$  inch up and down play in the wire. Tighten the lock nut on the adjusting screw and the cap screws and nut holding the generator.

**Oiling:**—Put 8 or 10 drops of light engine oil in the oiler on the commutator end of the generator every month or each 1000 miles. The drive end bearing is in the engine and is oiled from the chain case.

**RELAY:**—Model 265-B. Relay is mounted on the generator. Relay contacts close at 570 R.P.M. or 8 M.P.H. when the generator voltage reaches 7.5 volts and open at 510 R.P.M. or 7 M.P.H. with a discharge current of 1-2.5 amperes. Relay contacts separate .015-.025 inch. Air gap is .014 inch with contacts closed. Charging current is approximately 2 amperes at closing of contacts.

**LIGHTING:**—Soreng Manegold Switch Model 5150. Delco-Remy Dimmer Switch Model 465-C. Lighting switch is mounted on the instrument panel. Dimming is by resistance on the dimmer switch mounted on the toeboard. Headlights are 6-8 volt, 21 cp. S.C. Mazda 1129. Side, dash, dome and corner lights are each 6-8 volt, 3 cp. S.C. Mazda 63. Stop and backing lights are 6-8 volt, 21 cp. S.C. Mazda 1129. Ignition switch light and tail light are in series and are each 3-4 volt, 2 cp. S.C. Mazda 61. Step light on Model 137 is 6-8 volt, 3 cp. S.C. Mazda 63.

**CURRENT LIMIT RELAY:**—Model 410-B. This device is a vibrating circuit breaker mounted on the dash and connected in the lighting lines. It begins to operate when the current reaches 25-30 amperes and continues limiting the current to 2-15 amperes. Circuit breaker contact gap is .012-.030 inch. Air gap is .019-.025 inch.

**FUSES:**—Generator field fuse is 5 ampere capacity. Accessory fuses are 10 ampere capacity.

# GRAHAM PAIGE

MODEL 612 (1929) SERIAL NUMBERS 848,001 UP  
PRODUCTION STARTED JANUARY 2, 1929  
DELCO-REMY GENERATING, STARTING SYSTEM  
DELCO-REMY IGNITION

**BATTERY:**—Willard, Type WSB-13, 6 volt, 86 ampere hour. The positive (+) terminal is grounded. Lighting capacity (5 ampere rate) is 5 amperes for 16.8 hours. Battery is mounted under right front seat.

**IGNITION:**—Coil Model 528-C. Coil is mounted on the back of the dash (in the front compartment). Ignition current is 1.8 amperes at 6 volts with engine running and 4 amperes at 6 volts with engine stopped.

**Distributor Model 639-V.** Breaker contacts separate .018-.022 inch. Set contact gap by loosening lock screw on crescent shaped stationary contact mounting plate and turning eccentric adjusting screw until correct gap is obtained with breaker arm on lobe of cam. Resurface contacts when necessary with a fine flat contact file or on a medium hard oilstone. Breaker arm spring tension is 17-21 ounces. Distributor is full automatic with an auxiliary retard controlled by the button on the dash. Automatic advance begins at 600 R.P.M. (engine). Maximum automatic advance is 20 degrees reached at 2800 R.P.M. Manual advance is 30 degrees (engine).

**Mounting:**—Distributor is mounted on the cylinder head and can be removed from the left side. To remove distributor, disconnect primary lead and remove distributor head with cables intact. Then loosen advance arm clamp screw and lift distributor from place. Distributor can be removed without disturbing timing if the advance arm is left clamped to the distributor and the control wire and hold-down screw taken off. The distributor can then be lifted from place. In mounting distributor, make certain that the tongue on the drive shaft meshes with the slot in the oil pump shaft.

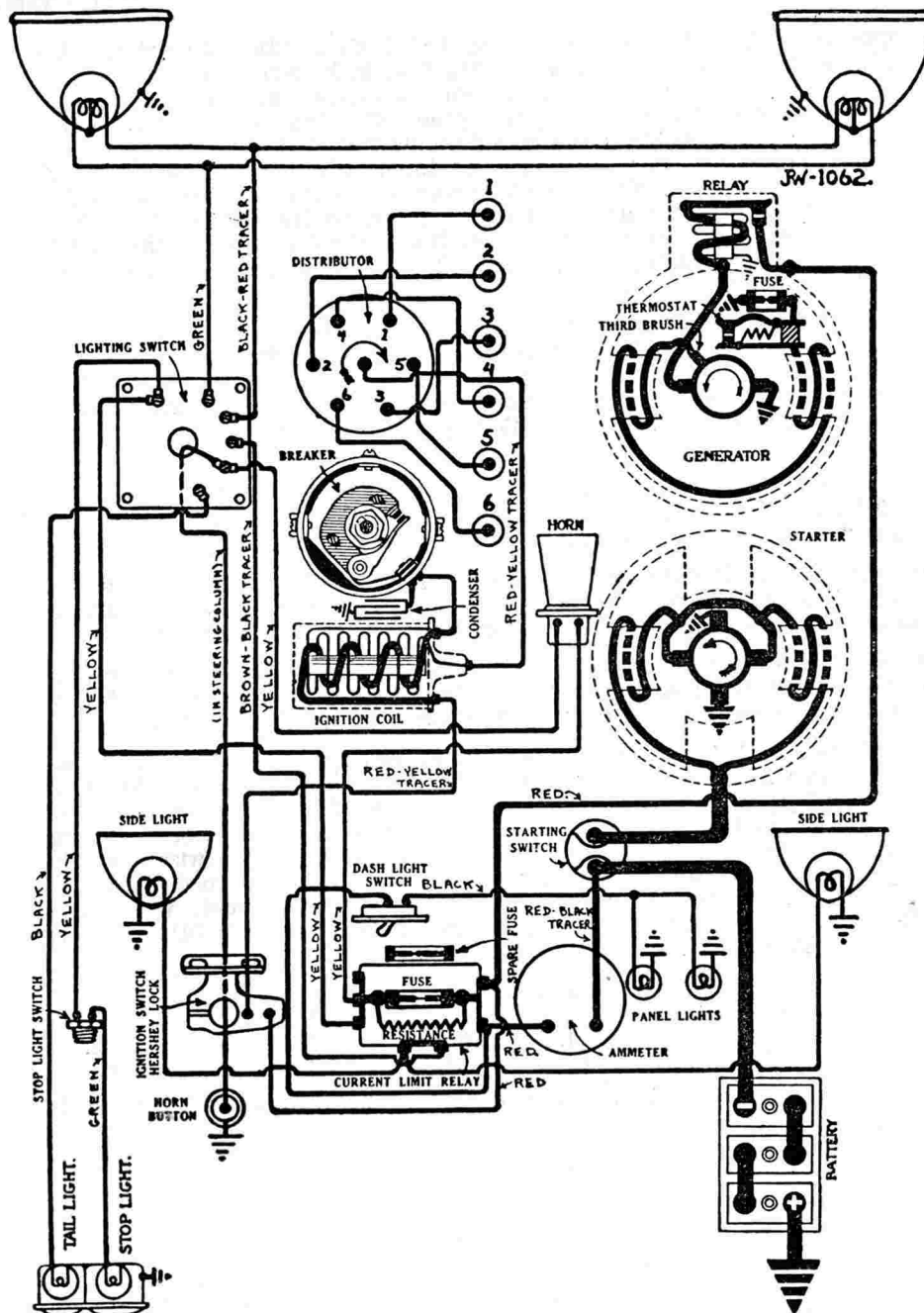
**Oiling:**—Fill the grease cup on the side of the shaft with medium cup grease and turn down one turn every two weeks or each 500 miles. Every 1000 miles remove the distributor head and rotor and oil the wick oiler in the center of the shaft with light engine oil. Put a small bit of vaseline on the face of the breaker cam.

**Timing:**—Breaker contacts begin to separate when the piston entering power stroke reaches a position 1 degree or 7/64 inch (on 12½ inch flywheel) before top dead center with the spark control button pushed in corresponding to the fully advanced position. To set timing, crank engine over until piston No. 1 enters compression stroke (the up stroke with both valves closed). Make certain that spark control button is pushed all the way in and that distributor is rotated counter-clockwise as far as possible. Continue to crank engine until the flywheel mark 'Spark Full Advance' is opposite the indicator in the peephole in the front face of the flywheel housing on the right side of the engine directly above the starter. Then loosen advance arm clamp screw and rotate distributor housing until contacts begin to open. Tighten the clamp screw and connect the terminal directly opposite the rotor to the spark plug in cylinder No. 1. Connect the remaining spark plugs in order 5-3-6-2-4 clockwise around the distributor head.

**Firing Order:**—The firing order is 1-5-3-6-2-4.

**Spark Plugs:**—Spark plugs are ⅞-18 S.A.E. Standard. Gaps are .023-.025 inch.

**VALVE TIMING:**—INLET VALVES:—Head diameter, 1 9/16 inches. Stem diameter, .340 inch. Stem length, 5½ inches (end of stem to top of seat). Valve lift, .3125 inch. Spring pressure, 50-55 pounds (valve closed). Tappet clearance, .006 inch (cold). Inlet valves open at top dead center and close 40 degrees after lower dead center with the piston .4125 or 13/32 inch up on the compression stroke.





# GRAHAM PAIGE

MODEL 612 (1929) SERIAL NUMBERS 848,001 UP  
PRODUCTION STARTED JANUARY 2, 1929  
DELCO-REMY GENERATING, STARTING SYSTEM  
DELCO-REMY IGNITION

**EXHAUST VALVES:**—Head diameter, 1 15/32 inches. Stem diameter, .340 inch. Stem length, 5 1/2 inches (end of stem to top of seat). Valve lift, .3175 inch. Spring pressure, 50-55 pounds (valve closed). Tappet clearance, .010 inch (cold). Exhaust valves open 40 degrees or 4.2325 inches on the flywheel before lower dead center with the piston .4125 or 13/32 inch from the bottom of the power stroke and close 10 degrees or 1.058 inches on the flywheel after top dead center with the piston 3/64 inch down on the intake stroke. Flywheel distances are correct with standard 12 1/2 inch flywheel. Valve stem guides are removable. Oversize valves are not made.

**STARTER:**—Model 713-K. Starter is connected to the engine through an inboard Bendix drive. The direction of rotation is counter-clockwise, viewed from the commutator end. Starter brush spring tension is 24-28 ounces. Starter cranks the engine at 120 R.P.M. drawing 150-200 amperes.

## Starter Data

Torque	R.P.M.	Volts	Amperes
0 lb. ft. ....	5000 .....	5 .....	65 .....
12 " .....	Lock .....	3.6 .....	475 .....

**Mounting:**—Starter is flange mounted at right of engine on forward side of flywheel housing. To remove starter, disconnect cable and remove nuts on flange mounting studs. Pull starter forward and lift from place.

**Oiling:**—Put 8 or 10 drops of light engine oil in the oiler on the commutator end of the starter every two weeks or each 500 miles. The drive end bearing is oilless.

**GENERATOR:**—Model 955-Q. The direction of rotation is counter-clockwise, viewed from the commutator end. Generator current regulation is by third brush shunt field and thermostat. Thermostat contacts open at 165°F. cutting the resistance across the thermostat contacts in series with the shunt field and reducing the output approximately 40%. To adjust the generator output, remove the commutator cover band and loosen the small round headed screw on the generator end plate. Then shift the third brush in a counter-clockwise direction to increase the charging rate and in the opposite direction to decrease the charging rate. Tighten the screw after making the adjustment. With standard car setting, the maximum charging rate is 10.5 amperes (hot) reached at 2000 R.P.M. or 30 miles per hour.

## Generator Data

Cold Test			Hot Test		
Amperes	Volts	R.P.M.	Amperes	Volts	R.P.M.
19-21 .....	8.5 .....	1450 .....	10.5 .....	7.5 .....	1800-2000 .....

Motoring, generator draws 5.5 amperes at 6 volts. Shunt field current is 4-6.1 amperes at 6 volts. Brush spring tension is 14-18 ounces. A 6 ampere field fuse is mounted on the generator end plate and can be removed by taking out the plug over the fuse mounting.

**Mounting:**—Generator is cradle mounted at right of engine and is driven by an extension of the water pump shaft. To remove generator, disconnect lead and drive coupling and loosen mounting strap. Then lift generator from place.

**Oiling:**—Put 8 or 10 drops of light engine oil in the oiler at each end of the generator every two weeks or each 500 miles.

**RELAY:**—Model 265-B. Relay is mounted on the generator. Relay contacts close when the voltage of the generator reaches 6.75-7.5 volts and open with a discharge current of 0-2.5 amperes. Relay contacts separate .015-.025 inch. Air gap is .014-.020 inch with contacts closed.

**LIGHTING:**—Lighting switch is mounted at lower end of steering column. Headlights have double filament bulbs instead of dimming. Headlights are 6-8 volt, 21-21 cp. D.C. Mazda 1110. Stop light is 6-8 volt, 15 cp. S.C. Mazda 87. Side lights are 6-8 volt, 3 cp. S.C. Mazda 63. Instrument panel lights and tail light are each 6-8 volt, 3 cp. S.C. Mazda 63.

**Switches:**—Stop light switch screws in forward end of Lockhead brake master cylinder at left of engine. Starter switch is mounted on the toeboard.

**CURRENT LIMIT RELAY:**—This device is connected in the lighting lines. It consists of a fuse block mounted on the dash with a fixed resistance connected across a 20 ampere capacity fuse. When the current of the lighting lines reaches 20 amperes the fuse will blow out causing the current to flow through the resistance. The resistance will limit the current flow to 30 amperes

**FUSES:**—Generator field fuse is 6 ampere capacity. Lighting fuse on block on dash is 20 ampere capacity.

# GRAHAM PAIGE

**MODEL 615 (1929) SERIAL NUMBERS 713,001 UP**  
**PRODUCTION STARTED JANUARY 2, 1929**  
**DELCO-REMY GENERATING, STARTING SYSTEM**  
**DELCO-REMY IGNITION**

**BATTERY:**—Willard, Type WSB-15, 6 volt. The positive (+) terminal is grounded. Starting capacity (20 minute rate) is 105 amperes for 20 minutes. Lighting capacity (5 ampere rate) is 5 amperes for 20 hours. Battery is mounted under the right front seat.

**IGNITION:**—Coil Model 528-C. Ignition coil is mounted on the rear of the dash in the front compartment. Ignition current is 1.8 amperes at 6 volts with engine running and 4 amperes at 6 volts with engine stopped.

**Distributor Model 639-W.** Breaker contacts separate .018-.022 inch. Set contact gap by loosening lock screw on crescent shaped stationary contact mounting plate and turning eccentric adjusting screw until correct gap is secured with breaker arm on lobe of cam. Resurface contacts when necessary with a fine flat contact file or on a medium hard oilstone. Breaker arm spring tension is 17-21 ounces. Distributor is full automatic with an auxiliary retard controlled by a button on the dash. Automatic advance begins at 400 R.P.M. (engine). Maximum automatic advance is 20 degrees reached at 2600 R.P.M. (engine). Manual advance is 30 degrees (engine).

**Mounting:**—Distributor is mounted on the cylinder head and can be removed from the left side. To remove distributor, disconnect primary lead and remove distributor head with cables intact. Then loosen advance arm clamp screw and lift distributor from place. Distributor can be removed without disturbing timing if the advance arm is left clamped in place and the control wire and hold-down screw are disconnected. The distributor can then be lifted from place. In mounting distributor, make certain that the tongue on the end of the distributor shaft fits into the slot in the end of the drive shaft. The tongue is offset so that the distributor cannot be assembled incorrectly.

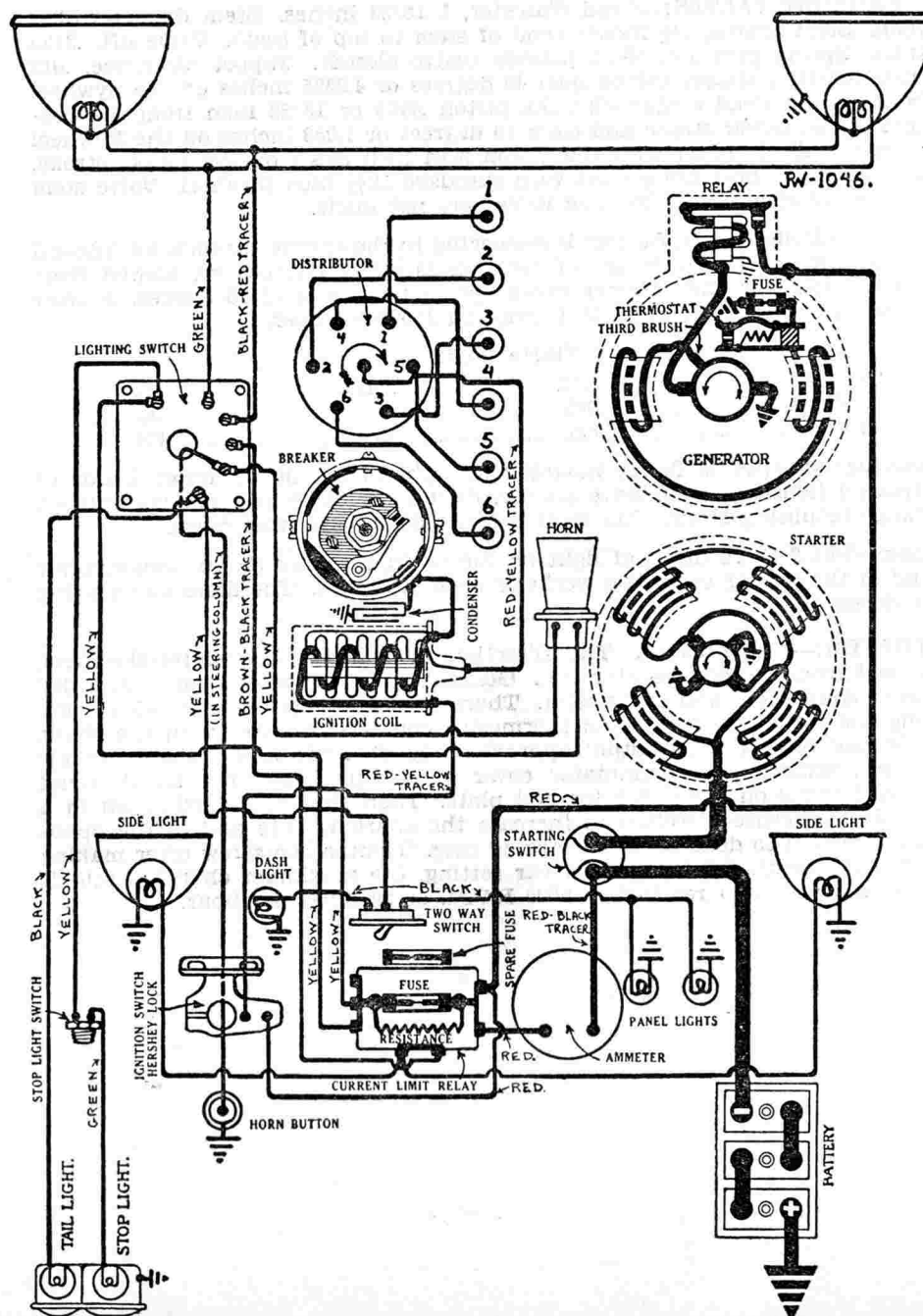
**Oiling:**—Fill the grease cup on the side of the distributor shaft with medium cup grease and turn down one turn every two weeks or each 500 miles. Every 1000 miles remove the distributor head and rotor and saturate the wick oiler in the center of the shaft with light engine oil and put a small bit of vaseline on the face of the breaker cam.

**Timing:**—Breaker contacts begin to separate when the piston entering power stroke reaches a position 1 degree or  $\frac{1}{8}$  inch (on standard  $14\frac{1}{8}$  inch flywheel) before top dead center with the spark control button in the fully advanced position (pushed all the way in to the dash). To set timing, crank engine over until piston No. 1 enters compression stroke (the up stroke with both valves closed). Fully advance spark control button and make certain that distributor housing is rotated counter-clockwise as far as possible. Then continue to crank engine until flywheel mark 'Spark Full Advance' is opposite the indicator in the peephole in the front face of the flywheel housing on the left of the engine. Loosen advance arm clamp screw and rotate distributor housing until contacts begin to open. Tighten the clamp screw and connect the terminal directly opposite the rotor to the spark plug in cylinder No. 1. Connect the remaining spark plugs in order 5-3-6-2-4 clockwise around the distributor head.

**Firing Order:**—The firing order is 1-5-3-6-2-4.

**Spark Plugs:**—Spark plugs are  $\frac{7}{8}$ -18 S.A.E. Standard. Gaps are .023-.025 inch.

**VALVE TIMING:**—INLET VALVES:—Head diameter, 1  $\frac{9}{16}$  inches. Stem diameter, .340 inch. Stem length,  $5\frac{1}{2}$  inches (end of stem to top of seat). Valve lift, .3125 inch. Spring pressure, 50-55 pounds (valve closed). Tappet clear-



# GRAHAM PAIGE

MODEL 615 (1929) SERIAL NUMBERS 713,001 UP  
PRODUCTION STARTED JANUARY 2, 1929  
DELCO-REMY GENERATING, STARTING SYSTEM  
DELCO-REMY IGNITION

ance, .006 inch (cold). Inlet valves open at top dead center and close 40 degrees or 4.931 inches on the flywheel after lower dead center with piston .4125 or 13/32 inch up on compression stroke.

**EXHAUST VALVES:**—Head diameter, 1 15/32 inches. Stem diameter, .340 inch. Stem length, 5 1/2 inches (end of stem to top of seat). Valve lift, .3175 inch. Spring pressure, 50-55 pounds (valve closed). Tappet clearance, .010 inch (cold). Exhaust valves open 40 degrees or 4.931 inches on the flywheel before lower dead center with the piston .4125 or 13/32 inch from the bottom of the power stroke and close 10 degrees or 1.232 inches on the flywheel after top dead center with the piston .0422 or 3/64 inch down on inlet stroke. Flywheel distances are correct for standard 14 1/8 inch diameter flywheel. Valve stem guides are removable. Oversize valves are not made.

**STARTER:**—Model 718-E. Starter is connected to the engine through an out-board Bendix drive. The direction of rotation is counter-clockwise, viewed from the commutator end. Brush spring tension is 24-28 ounces. Starter cranks the engine at 120 R.P.M. drawing 150-200 amperes.

Starter Data			
Torque	R.P.M.	Volts	Amperes
0 lb. ft.	6000	5	65
15 "	Lock	3.15	570

**Mounting:**—Starter is flange mounted at right of engine on forward side of flywheel housing. To remove starter, disconnect cable and remove nuts on flange mounting studs. Then pull starter forward and lift from place.

**Oiling:**—Put 8 or 10 drops of light engine oil in the oiler on the commutator end of the starter every two weeks or each 500 miles. The drive end bearing is oilless.

**GENERATOR:**—Model 957-B. The direction of rotation is counter-clockwise, viewed from the commutator end. Generator current regulation is by third brush shunt field and thermostat. Thermostat contacts open at 165°F. cutting the resistance across the thermostat contacts in series with the shunt field and reducing the output approximately 40%. To adjust the generator output, remove the commutator cover band and loosen the small round headed screw on the generator end plate. Then shift the third brush in a counter-clockwise direction to increase the charging rate and in the oppo-

site direction to decrease the charging rate. Tighten the screw after making the adjustment. With standard car setting the maximum charging rate is 10.5 amperes (hot) reached at 1650 R.P.M. or 26 miles per hour.

Generator Data					
Cold Test			Hot Test		
Amperes	Volts	R.P.M.	Amperes	Volts	R.P.M.
18-20	8.5	1300	10.5	7.5	1300-1500

Shunt field current is 4-6.1 amperes at 6 volts. Brush spring tension is 14-18 ounces.

**Mounting:**—Generator is cradle mounted at right of engine and is driven by extension of water pump shaft. To remove generator, disconnect lead and drive coupling and loosen mounting strap. Then lift generator from place.

**Oiling:**—Put 8 or 10 drops of light engine oil in each of the generator bearing oilers every two weeks or each 500 miles.

**RELAY:**—Model 265-B. Relay is mounted on the generator. Relay contacts close when the voltage of the generator reaches 7-7.5 volts and open with a discharge current of 0-2.5 amperes. Contacts separate .015-.025 inch. Air gap is .014-.020 inch with contacts closed.

**LIGHTING:**—Lighting switch is mounted at the lower end of the steering column. Double filament headlight bulbs are used instead of dimmers. Headlights are 6-8 volt, 21-21 cp. D.C. Mazda 1110. Side lights are 6-8 volt, 3 cp. S.C. Mazda 63. Stop light is 6-8 volt, 15 cp. S.C. Mazda 87. Dome light is 6-8 volt, 6 cp. S.C. Mazda 81. Instrument board lights and tail light are each 6-8 volt, 3 cp. S.C. Mazda 63.

**CURRENT LIMIT RELAY:**—This device is connected in the lighting lines. It consists of a fuse block mounted on the dash with a fixed resistance connected across a 20 ampere capacity fuse. When the current of the lighting lines reaches 20 amperes the fuse will blow out causing the current to flow through the resistance. The resistance will limit the current flow to 30 amperes

**FUSES:**—Generator field fuse is 6 ampere capacity. Lighting fuse mounted on block on dash is 20 ampere capacity.



# GRAHAM PAIGE

**MODEL 621 (1929) SERIAL NUMBERS 608,001 UP**  
**PRODUCTION STARTED JANUARY 2, 1929**  
**DELCO-REMY GENERATING, STARTING SYSTEM**  
**DELCO-REMY IGNITION**

**BATTERY:**—Willard, Type WSB-17, 6 volt. The positive (+) terminal is grounded. Starting capacity (20 minute rate) is 125 amperes for 20 minutes. Lighting capacity (5 ampere rate) is 5 amperes for 22.5 hours. Battery is mounted under driver's seat on the right side.

**IGNITION:**Coil Model 528-C. Ignition coil is mounted on the back of the dash and is accessible from the driving compartment. Ignition current is 1.8 amperes at 6 volts with engine running and 4 amperes at 6 volts with engine stopped.

**Distributor Model 640-U.** Breaker contacts separate .018-.022 inch. Set contact gap by loosening lock screw on stationary contact mounting plate directly behind breaker arm and turning eccentric adjusting screw until correct gap is secured with breaker arm on lobe of cam. Resurface contacts when necessary with a fine flat contact file or on a medium hard oilstone. Breaker arm spring tension is 18-21 ounces. Distributor is full automatic with an auxiliary retard controlled by a button on the dash. Automatic advance begins at 400 R.P.M. (engine). Maximum automatic advance is 22 degrees reached at 2600 R.P.M. (engine). Manual advance is 30 degrees (engine).

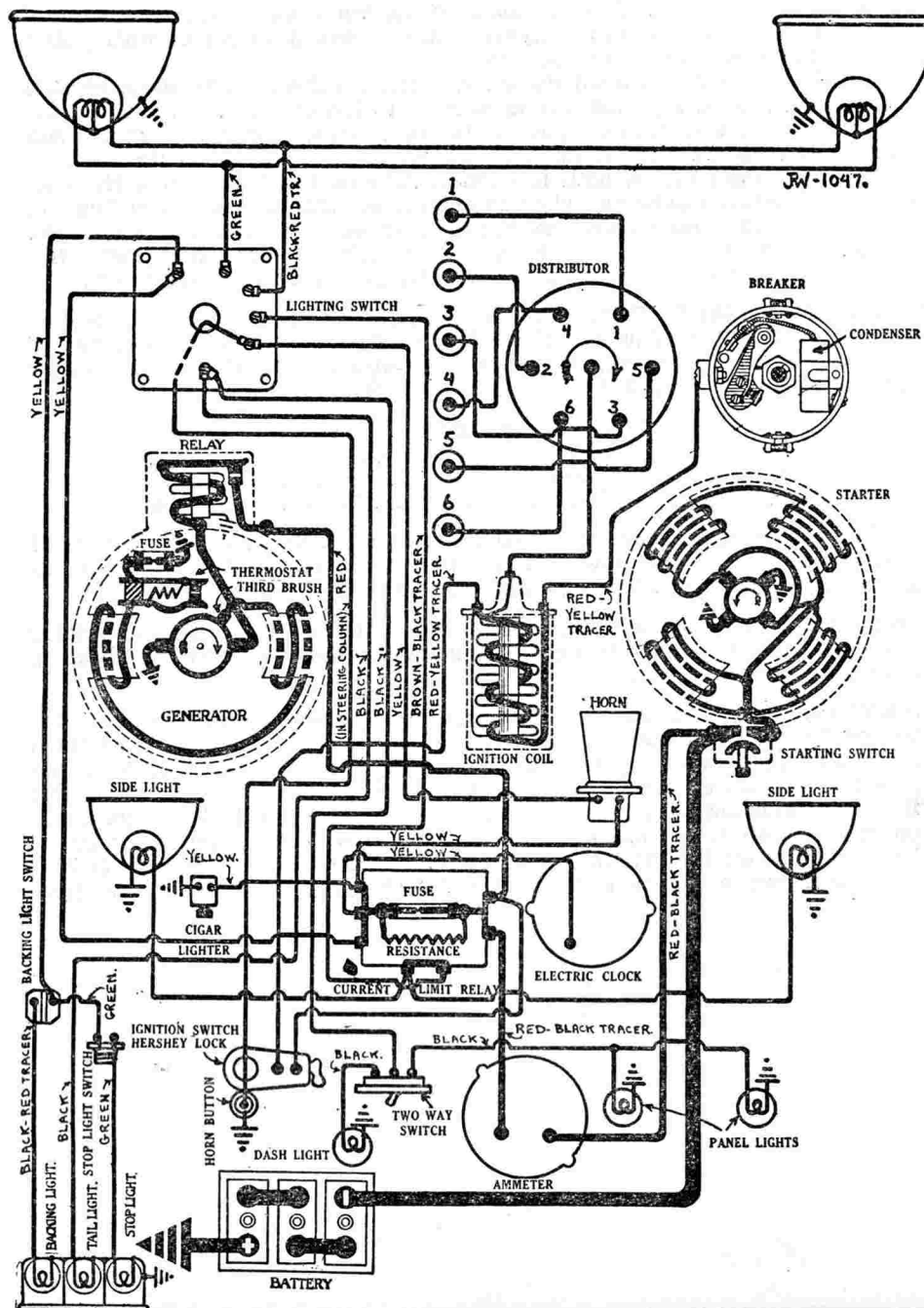
**Mounting:**—Distributor is mounted on the cylinder head and can be removed from the right side. To remove distributor, disconnect primary lead and remove distributor head with cables intact. Then loosen advance arm clamp screw and lift distributor from place. The distributor can be removed without disturbing timing if the advance arm is left clamped to the distributor housing and the spark control wire is disconnected and the hold-down screw removed. In replacing distributor, make certain that the tongue on the end of the distributor shaft fits in the slot in the end of the drive shaft. The tongue is offset so that the distributor cannot be mounted incorrectly.

**Oiling:**—Fill the grease cup on the side of the distributor housing with medium cup grease and turn down one turn every two weeks or each 500 miles. At the same time, remove the distributor head and rotor and saturate the wick oiler in the center of the shaft with light engine oil and put a small bit of vaseline on the face of the breaker cam.

**Timing:**—Breaker contacts begin to separate when the piston entering power stroke reaches a position 1 degree before top dead center with the spark control button in the fully advanced position (pushed all the way in toward the dash). To set timing, crank engine over until piston No. 1 enters compression stroke (the up stroke with both valves closed). Make certain that spark control button is in the advanced position and that distributor housing is rotated counter-clockwise as far as possible. Continue to crank engine until piston reaches the firing position when the flywheel mark 'Spark Full Advance' will be opposite the indicator in the peephole in the forward face of the flywheel housing at the right of the engine directly above the starter. Then loosen the advance arm clamp screw and rotate the distributor until contacts begin to open. Tighten the clamp screw and connect the terminal directly opposite the rotor to the spark plug in cylinder No. 1. Connect the remaining spark plugs in order 5-3-6-2-4 clockwise around the distributor head.

**Spark Plugs:**—Spark plugs are  $\frac{7}{8}$ -18 S.A.E. Standard. Gaps are .023-.025 inch.

**VALVE TIMING:**—**INLET VALVES:**—Head diameter, 1  $\frac{27}{32}$  inches. Stem diameter, .340 inch. Stem length, 6  $\frac{41}{64}$  inches (end of stem to top of seat). Valve lift, .341 inch. Spring pressure, 50-55 pounds (valve closed). Tappet



# GRAHAM PAIGE

MODEL 621 (1929) SERIAL NUMBERS 608,001 UP  
PRODUCTION STARTED JANUARY 2, 1929  
DELCO-REMY GENERATING, STARTING SYSTEM  
DELCO-REMY IGNITION

clearance, .010 inch (cold). Inlet valves open at top dead center and close 45 degrees after lower dead center with piston 37/64 inch up on compression stroke.

**EXHAUST VALVES:**—Head diameter, 1 3/4 inches. Stem diameter, .340 inch. Stem length, 6 41/64 inches (end of stem to top of seat). Valve lift, .341 inch. Spring pressure, 50-55 pounds (valve closed). Tappet clearance, .010 inch (cold). Exhaust valves open 50 degrees or 6 59/64 inches before lower dead center with the piston 23/32 inch from the bottom of the power stroke and close 10 degrees or 1 25/64 inches on the flywheel with the piston 3/64 inch down on inlet stroke. Distances are correct for standard 15 3/8 inch diameter flywheel. Valve stem guides are removable. Oversize valves are not made.

**STARTER:**—Model 725-G. Starter is connected to the engine through a manual pinion shift interconnected with the starting switch. The direction of rotation is counter-clockwise, viewed from the commutator end. Brush spring tension is 24-28 ounces. Starter cranks the engine at 90 R.P.M. drawing 150-200 amperes.

Starter Data			
Torque	R.P.M.	Volts	Amperes
0 lb. ft.	6000	5	60
16 "	Lock	3.2	600

**Mounting:**—Starter is flange mounted at right of engine on forward side of flywheel housing. To remove starter, disconnect cable and pedal rod linkage and remove nuts on flange mounting studs. Then pull starter forward and lift from place.

**Oiling:**—Put 8 or 10 drops of light engine oil in the oiler on the commutator end of the starter every two weeks or each 500 miles.

**GENERATOR:**—Model 957-C. The direction of rotation is clockwise, viewed from the commutator end. Generator current regulation is by third brush shunt field and thermostat. Thermostat contacts open at 165° F. cutting the resistance across the thermostat contacts in series with the shunt field and reducing the output approximately 40%. To adjust generator output, remove the commutator cover band and loosen the small round headed screw on the generator end plate. Then shift the third brush in a clockwise direction to increase the charging rate and in the opposite direc-

tion to decrease the charging rate. Tighten the screw after making the adjustment. With standard car setting the maximum charging rate is 10.5 amperes reached at 1400 R.P.M. or 25 miles per hour.

Generator Data					
Cold Test			Hot Test		
Amperes	Volts	R.P.M.	Amperes	Volts	R.P.M.
18-20	8.5	1300	10.5	7.5	1300-1500

Motoring, generator draws 5.5 amperes at 6 volts. Shunt field current is 4-6.1 amperes at 6 volts. Brush spring tension is 14-18 ounces.

**Mounting:**—Generator is cradle mounted at left of engine and is driven by an extension of the water pump shaft. To remove generator, disconnect lead and drive coupling and loosen mounting strap. Then lift generator from place.

**Oiling:**—Put 8 or 10 drops of light engine oil in the oiler at each end of the generator every two weeks or each 500 miles.

**RELAY:**—Model 265-B. Relay is mounted on the generator. Relay contacts close when the voltage of the generator reaches 7-7.5 volts and open with a discharge current of 0-2.5 amperes. Relay contacts separate .015-.025 inch. Air gap is .014-.020 inch with contacts closed.

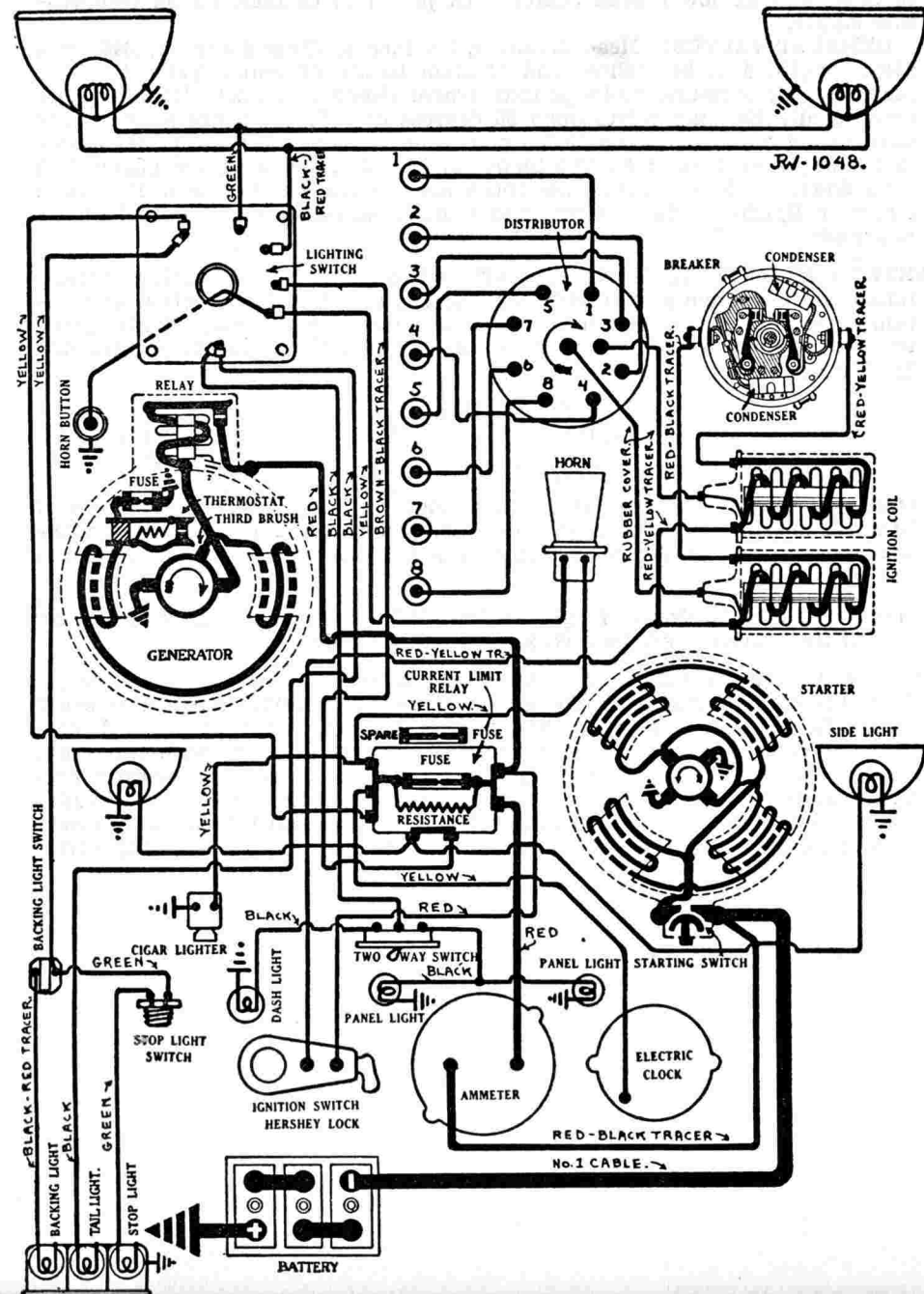
**LIGHTING:**—Lighting switch is mounted at lower end of steering column. Headlights have double filament bulbs instead of dimmers. Headlights are 6-8 volt, 21-21 cp. D.C. Mazda 1110. Side lights are 6-8 volt, 3 cp. S.C. Mazda 63. Stop light is 6-8 volt, 15 cp. S.C. Mazda 87. Dome light is 6-8 volt, 6 cp. S.C. Mazda 81. Instrument panel lights and tail light are each 6-8 volt, 3 cp. S.C. Mazda 63.

**CURRENT LIMIT RELAY:**—This device is connected in the lighting lines. It consists of a fuse block mounted on the dash with a fixed resistance connected across a 20 ampere capacity fuse. When the current of the lighting lines reaches 20 amperes the fuse will blow out causing the current to flow through the resistance. The resistance will limit the current flow to 30 amperes

**FUSES:**—Generator field fuse mounted on the end of the generator is 6 ampere capacity. Lighting fuse mounted on block on dash is 20 ampere capacity.

MODEL 827 (1929) SERIAL NUMBERS 713,001 UP  
MODEL 837 (1929) SERIAL NUMBERS 848,001 UP  
PRODUCTION STARTED JANUARY 2, 1929  
DELCO-REMY GENERATING, STARTING SYSTEM  
DELCO-REMY IGNITION

**Timing Distributor to Engine:**—Breaker contacts begin to separate when piston No. 1 entering power stroke reaches a position 8 degrees before top dead center when the flywheel mark 'Spark Full Advance' is opposite the indicator in the peephole in the front face of the flywheel on the right of





# GRAHAM PAIGE

MODEL 827 (1929) SERIAL NUMBERS 713,001 UP

MODEL 837 (1929) SERIAL NUMBERS 848,001 UP

PRODUCTION STARTED JANUARY 2, 1929

DELCO-REMY GENERATING, STARTING SYSTEM

DELCO-REMY IGNITION

the engine with the manual spark control button in the fully advanced position or pushed in toward the dash. To set timing, crank engine over until piston No. 1 enters compression stroke (the up stroke with both valves closed). Place spark control button in fully advanced position. Continue to crank engine until flywheel mark is opposite the indicator. Then loosen advance arm clamp screw and rotate distributor until one set of contacts begin to open. Tighten the clamp screw and connect the terminal opposite the rotor contact which is connected to the center terminal in the distributor head to the spark plug in cylinder No. 1. Connect remaining spark plugs in order 3-2-4-8-6-7-5 clockwise around the distributor head.

**Firing Order:**—The firing order is 1-6-2-5-8-3-7-4.

**Spark Plugs:**—Spark plugs are 18 MM. Metric. Gaps are .023-.025 inch.

**VALVE TIMING:**—**INLET VALVES:**—Head diameter,  $1\frac{5}{8}$  inches. Stem diameter, .371 inch. Stem length,  $5\frac{7}{16}$  inches (end of stem to top of seat). Spring pressure, 39-49 pounds (valve closed). Valve lift, .370 inch. Tappet clearance, .008 inch (cold). Inlet valves open 2 degrees or .277 inch on the flywheel after top dead center and close 47 degrees or 6.51 inches on the flywheel after lower dead center.

**EXHAUST VALVES:**—Head diameter,  $1\frac{9}{16}$  inches. Stem diameter, .371 inch. Stem length,  $5\frac{7}{16}$  inches (end of stem to top of seat). Valve lift, .370 inch. Spring pressure, 39-49 pounds (valve closed). Tappet clearance, .008 inch (cold). Exhaust valves open 43 degrees or 5.96 inches on the flywheel before lower dead center and close 2 degrees or .277 inch on the flywheel after top dead center. Flywheel distances are correct for standard  $15\frac{3}{8}$  inch flywheel. Valve stem guides are removable. Oversize valves are not made.

**STARTER:**—Model 725-G. Starter is connected to the engine through a manual pinion shift interconnected with the starter switch. The direction of rotation is counter-clockwise, viewed from the commutator end. Starter cranks the engine at 90 R.P.M. drawing 150-200 amperes. Brush spring tension is 24-28 ounces.

Starter Data			
Torque	R.P.M.	Volts	Amperes
0 lb. ft.	6000	5	60
16 "	Lock	3.2	600

**Mounting:**—Starter is flange mounted at right of engine on forward side of flywheel housing. To remove starter, disconnect cable and pedal rod linkage and remove nuts on flange mounting studs. Then pull starter forward and lift from place.

**Oiling:**—Put 8 or 10 drops of light engine oil in the oiler on the commutator end of the starter every two weeks or each 500 miles. The drive end bearing is oilless.

**GENERATOR:**—Model 957-C. The direction of rotation is clockwise, viewed from the commutator end. Generator current regulation is by third brush shunt field and thermostat. Thermostat contacts open at  $165^{\circ}$  F. cutting the resistance across the thermostat contacts in series with the shunt field and reducing the output approximately 40%. To adjust the charging rate, remove the commutator cover band and loosen the small round headed screw on the generator end plate. Then shift the third brush in a clockwise direction to increase the charging rate and in the opposite direction to decrease the charging rate. Tighten the screw after making the adjustment. With standard car setting, maximum charging rate is 10.5 amperes (hot) reached at 1425 R.P.M. or 25 M.P.H.

Generator Data					
Cold Test			Hot Test		
Amperes	Volts	R.P.M.	Amperes	Volts	R.P.M.
18-20	8.5	1300	10.5	7.5	1300-1500

Motoring, generator draws 5.5 amperes at 6 volts. Shunt field current is 4-6.1 amperes at 6 volts. Brush spring tension is 14-18 ounces.

**Mounting:**—Generator is cradle mounted at left of engine and is driven by an extension of the water pump shaft. To remove generator, disconnect lead and drive coupling and loosen mounting strap. Then lift generator from place.

**Oiling:**—Put 8 or 10 drops of light engine oil in the oiler at each end of the generator every two weeks or each 500 miles.

**RELAY:**—Model 265-B. Relay is mounted on the generator. Relay contacts close when the voltage of the generator reaches 7-7.5 volts and open with a discharge current of 0-2.5 amperes. Relay contacts separate .015-.025 inch. Air gap is .014-.020 inch with contacts closed.

**LIGHTING:**—Lighting switch is mounted at lower end of steering column. Headlights have double filament bulbs instead of dimmers. Headlights are 6-8 volt, 21-21 cp. D.C. Mazda 1110. Side lights are 6-8 volt, 3 cp. S.C. Mazda 63. Stop light is 6-8 volt, 15 cp. S.C. Mazda 87. Backing light is 6-8 volt, 21 cp. S.C. Mazda 1129. Instrument board lights, ignition switch light and tail light are each 6-8 volt, 3 cp. S.C. Mazda 63. Corner lights are 6-8 volt, 6 cp. S.C. Mazda 81.

**CURRENT LIMIT RELAY:**—This device is connected in the lighting lines. It consists of a fuse block mounted on the dash with a fixed resistance connected across a 20 ampere capacity fuse. When the current of the lighting lines reaches 20 amperes the fuse will blow out causing the current to flow through the resistance. The resistance will limit the current flow to 30 amperes

**FUSES:**—Generator field fuse is 6 ampere capacity. Lighting fuse mounted on block on dash is 20 ampere capacity.

# HUDSON

**SUPER SIX MODEL (1929) SERIAL NUMBERS 825415 UP**  
**PRODUCTION STARTED JANUARY 1, 1929**  
**AUTO-LITE GENERATING, STARTING SYSTEM**  
**AUTO-LITE IGNITION**

**BATTERY:**—Exide, Type 3-XI-15-IG, 6 volt. The negative (—) terminal is grounded. Starting capacity (20 minute rate) is 114 amperes for 20 minutes. Lighting capacity (5 ampere rate) is 5 amperes for 20 hours. Battery is mounted under the left front seat.

**IGNITION:**—Coil Model IG-4065. Coil is mounted on the front of the engine block. Ignition current is 1-3 amperes at 6 volts with engine running and 3.4-5 amperes at 6 volts with engine stopped.

**Distributor Model IGA-4058.** Breaker contacts separate .018-.020 inch. Set contact gap by loosening lock nut on stationary contact mounting stud and turning up stud until correct gap is secured with breaker arm on lobe of cam. Resurface contacts when necessary with a fine flat contact file or on a medium hard oilstone. Breaker arm spring tension is 16-20 ounces. Distributor is semi-automatic. Maximum manual advance is 28 degrees (engine). Automatic advance begins at 600 R.P.M. of engine. Maximum automatic advance is 36 degrees (engine) reached at 3200 R.P.M. Electrolock ignition switch is standard equipment.

**Mounting:**—Distributor is mounted on the crank case at the right of the engine. To remove distributor, disconnect manual advance rod and remove distributor head with cables intact. Then disconnect Electrolock at dash and take out two bolts in distributor mounting flange. Then lift distributor out and remove with Electrolock as a unit. The Electrolock can be removed from the distributor by taking off the nut on the terminal stud inside the case and pulling the Electrolock cable, ferrule and stud straight out from the distributor housing.

**Oiling:**—Put 6 or 8 drops of light engine oil in the oiler on the side of the distributor housing each 500 miles. Each 250 miles put one drop of oil on the breaker arm pivot pin. Every 5000 miles remove the distributor head and rotor and put a small bit of vaseline on the face of the breaker cam.

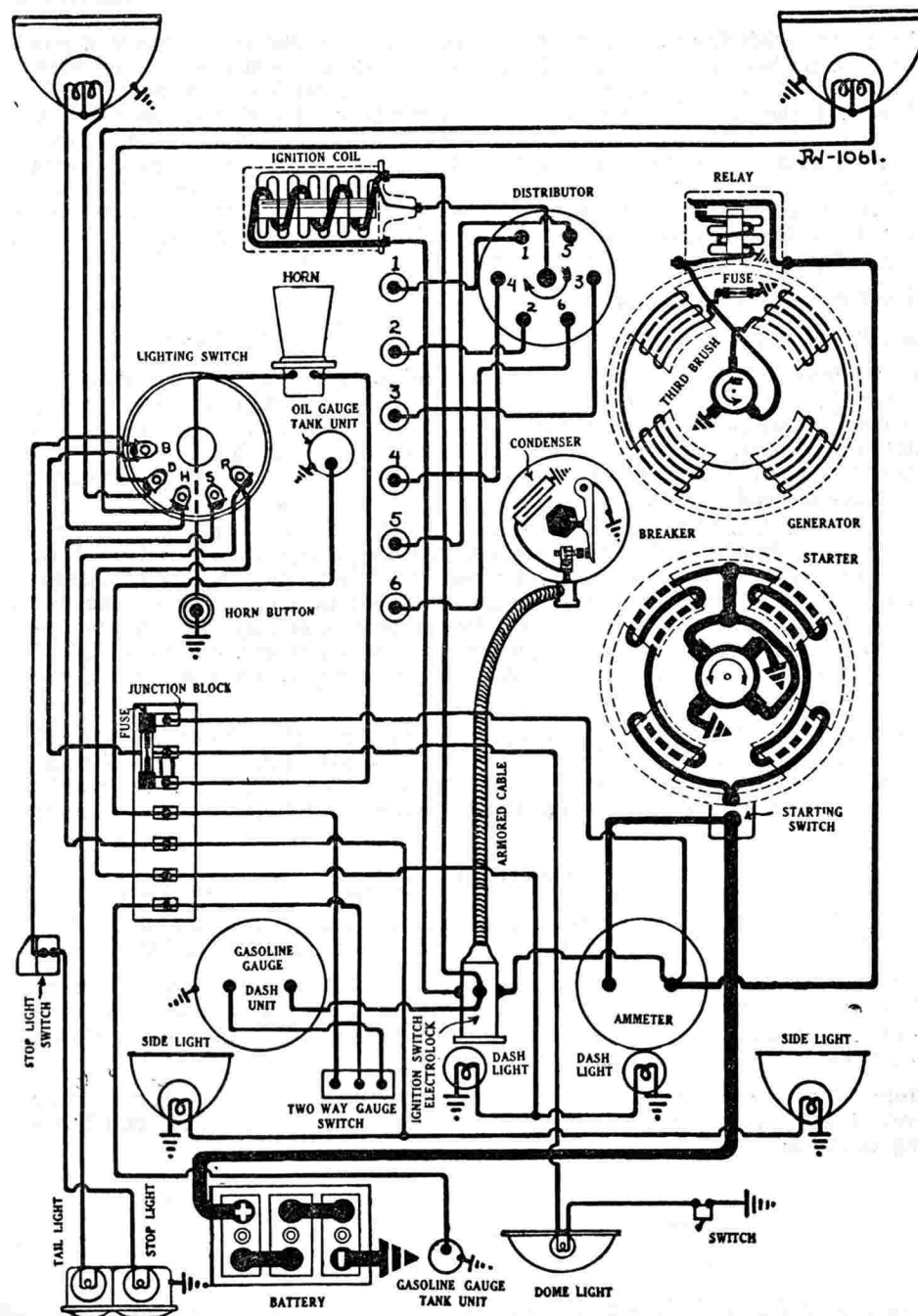
**Timing:**—Breaker contacts begin to open when the piston entering power stroke reaches a position 3 teeth on the flywheel before top dead center with the manual spark control fully advanced. To set timing, crank engine over until piston No. 1 enters compression stroke (the up stroke with both valves closed). Fully advance manual spark control lever. Continue to crank engine until the punch mark on the flywheel (which is three teeth before the top dead mark 'DC-1-6') is opposite the pointer on the inspection hole in the left side of the flywheel case. Then loosen the advance arm clamp screw and rotate the distributor until contacts begin to open. Tighten the clamp screw and connect the segment opposite the rotor to the spark plug in cylinder No. 1. Connect the remaining spark plugs in order 5-3-6-2-4 clockwise around the distributor head.

**Firing Order:**—The firing order is 1-5-3-6-2-4.

**Spark Plugs:**—Spark plugs are 18MM. Metric. Gaps are .025 inch.

**VALVE TIMING:**—INLET VALVES:—Head diameter, 2 1/32 inches. Stem diameter, .373 inch. Stem length, 6 inches. Valve life, 11/32 inch. Spring pressure, 96 pounds. Tappet clearance, .004-.006 inch.

**EXHAUST VALVES:**—Head diameter, 1 27/32 inches. Stem diameter, .373 inch. Stem length, 6 3/4 inches. Valve lift, 19/64 inch. Spring pressure, 75 pounds. Tappet clearance, .006-.008 inch. Valve stem guides are removable. Oversize valves are not made.



# HUDSON

SUPER SIX MODEL (1929) SERIAL NUMBERS 825415 UP  
PRODUCTION STARTED JANUARY 1, 1929  
AUTO-LITE GENERATING, STARTING SYSTEM  
AUTO-LITE IGNITION

**STARTER:—Model MUA-4001.** Starter is connected to the engine through a sliding gear shift interconnected with the starting switch. Pressing down on the starting pedal meshes the gears and closes the starting switch. When the pedal is released a spring reverses these operations. The direction of rotation is clockwise, viewed from the commutator end. Brush spring tension is 1¾-2¼ pounds. Starter cranks the engine at 110 R.P.M. drawing 250 amperes at 5.5 volts.

Starter Data			
Torque	R.P.M.	Volts	Amperes
0 lb. ft.	4200	6	50
2 "	1500	5.3	130
4 "	1000	5.0	200
6 "	600	4.6	275
8 "	450	4.2	340
22 "	Lock	3.5	500

**Mounting:—**Starter is cradle mounted on special mounting bracket at the right of the engine. The starting switch is built in the bracket. To remove starter, loosen the mounting clamp band and lift starter from place.

**Oiling:—**Starter bearings are oilless. They require no attention.

**GENERATOR:—Model GAB-4008.** The direction of rotation is counter-clockwise, viewed from the commutator end. Generator current regulation is by third brush shunt field. To adjust generator output, remove the commutator cover band and shift the third brush mounting plate by tapping on the mounting stud with a screwdriver. Shift the third brush in a counter-clockwise direction to increase the charging rate and in the opposite direction to decrease the charging rate. The brush is held in position by friction between the mounting stud and the end plate. With standard car setting, maximum charging rate is 15 amperes (cold) reached at 1300 R.P.M. of the generator armature.

## Generator Data

Cold Test (72°F.)			Hot Test (206°F.)		
Amperes	Volts	R.P.M.	Amperes	Volts	R.P.M.
4	6.8	630	4	6.8	790
10	7.4	800	10	7.6	1240
14	7.8	1020	12.5	8.0	1550
15	8.0	1300	11	7.8	2000
12	7.8	1950			

Motoring at 355-390 R.P.M. generator draws 4.7-5.2 amperes at 6 volts. Shunt field current is 6.1-6.8 amperes at 6 volts. Each coil draws 24.4-27.2 amperes at 6 volts. Brush spring tension is 1-1.5 pounds. The fuse in the field circuit is 7.5 ampere capacity.

**Mounting:—**Generator is cradle mounted on special bracket at right of engine. To remove generator, disconnect lead and drive coupling and loosen mounting clamp band. Then lift generator from place.

**Oiling:—**Put 4 or 5 drops of light engine oil in each of the generator bearing oilers every two weeks or each 500 miles of operation.

**RELAY:—Model CB-4014.** Relay is mounted on the generator. Relay closes at 545-625 R.P.M. when the generator voltage reaches 7-7.5 volts and opens with a discharge current of 0-2.5 amperes. Charging current must not exceed 5 amperes at closing of contacts. Contacts separate .025-.035 inch. Air gap is .010-.030 inch with contacts closed.

**LIGHTING:—Clum Switch Model 10717.** Lighting switch is mounted at base of steering column. Double filament headlights using a second 21 cp. filament instead of dimmers are standard equipment. Headlights are 6-8 volt, 21-21 cp. D.C. Mazda 1110. Stop light is 6-8 volt, 15 cp. S.C. Mazda 87. Side, dash and tail lights are each 6-8 volt, 3 cp. S.C. Mazda 63.

**FUSES:—**Generator field fuse is 7.5 ampere capacity. Lighting fuse mounted on junction block on dash is 20 ampere capacity.



# HUPMOBILE

## CENTURY SIX MODEL A (1929)

### AUTO-LITE GENERATING, STARTING SYSTEM AUTO-LITE IGNITION

**BATTERY:**—Willard, Type RSB-15, 6 volt. The positive (+) terminal is grounded. Starting capacity (20 minute rate) is 114 amperes for 20 minutes. Lighting capacity (5 ampere rate) is 5 amperes for 20 hours. Battery is mounted under the left front seat.

**IGNITION:**—Coil Model IG-4065. Coil is mounted on the dash. Ignition current is 1-3 amperes at 6 volts with engine running and 3.4-5 amperes at 6 volts with engine stopped.

**Distributor Model IGC-4003.** Breaker contacts separate .018-.020 inch. Set contact gap by loosening lock nut on stationary contact mounting stud and turning up stud until correct gap is secured with the breaker arm on lobe of the cam. Resurface contacts with a fine flat contact file or on a medium hard oilstone. Breaker arm spring tension is 16-20 ounces. Distributor is semi-automatic. Maximum manual advance is 30 degrees (engine). Automatic advance begins at 1000 R.P.M. of engine. Maximum automatic advance is 16 degrees reached at 3600 R.P.M. An Electrolock ignition switch is standard equipment.

**Mounting:**—The Electrolock must be removed as a unit with the distributor whenever the distributor is taken off the car. The Electrolock can then be removed by taking off the nut on the terminal stud inside the distributor case and pulling out the Electrolock cable, ferrule and stud assembly. To remove distributor, disconnect Electrolock at dash and remove distributor head with cables intact. Then take out mounting screw and lift distributor from place.

**Oiling:**—Put 4 or 5 drops of light engine oil in the oiler on the side of the distributor every two weeks or each 500 miles of operation. Every 1000 miles remove the distributor head and rotor and put a small bit of vaseline on the face of the breaker cam.

**Timing:**—Breaker contacts begin to separate when the piston entering power stroke reaches top dead center with the manual spark control fully retarded. To set timing, crank engine over until piston No. 1 enters compression stroke (the up stroke with both valves closed). Fully retard spark control lever. Continue to crank engine until piston reaches top dead center. Then loosen the advance arm clamp screw and rotate distributor until the contacts begin to open. Tighten the clamp screw and connect the segment opposite the rotor to the spark plug in cylinder No. 1. Connect the remaining spark plugs in order 5-3-6-2-4 counter-clockwise around the distributor head.

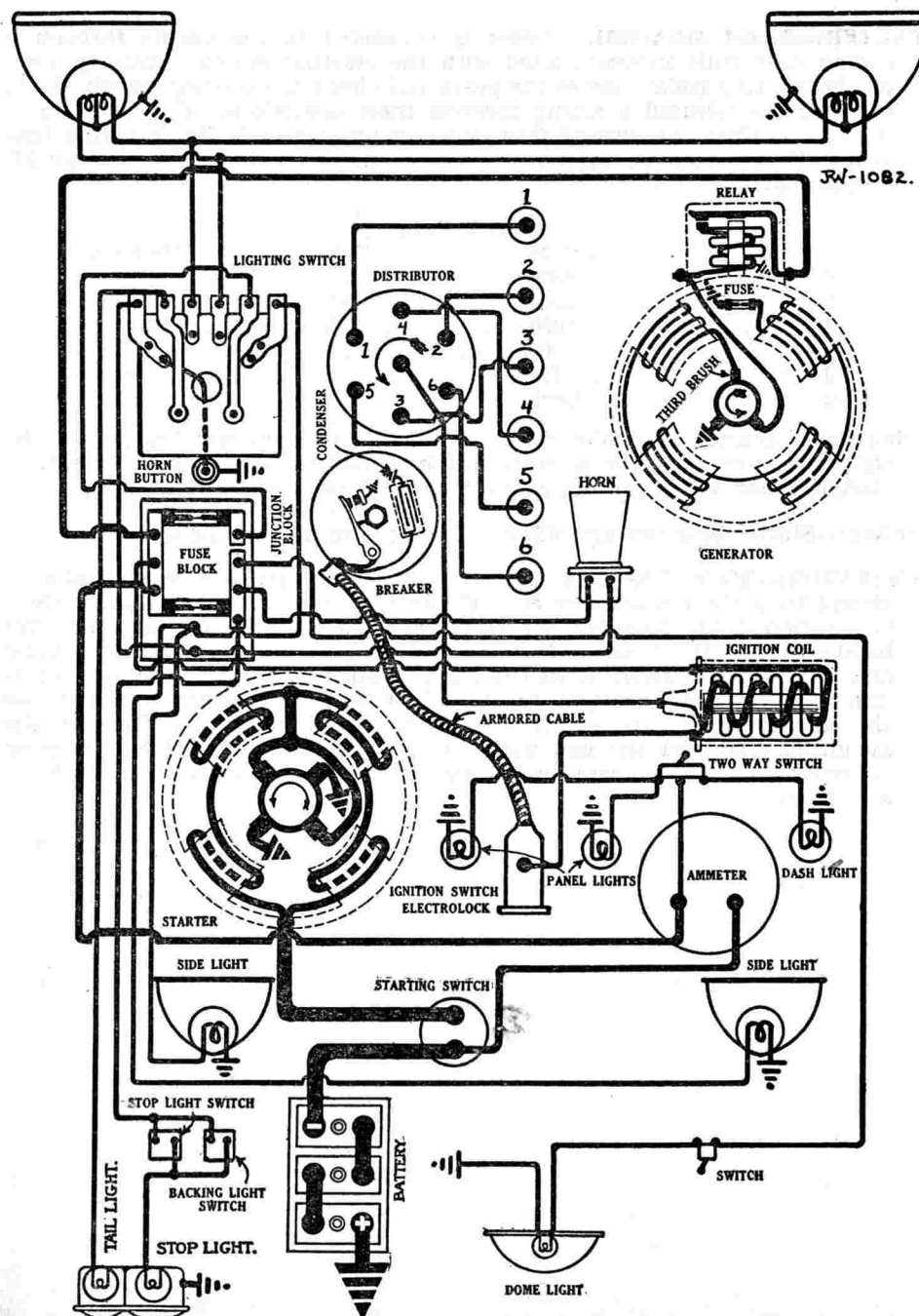
**Firing Order:**—The firing order is 1-5-3-6-2-4.

**Spark Plugs:**—Spark plugs are 7/8-18 S.A.E. Long. Gaps are .025 inch.

**VALVE TIMING:**—Specifications:—Head diameter, 1½ inches. Valve lift, 5/16 inch. Tappet clearance, .005 inch (inlet) and .006 inch (exhaust).

**Timing:**—Inlet valves open 4 degrees after top dead center and close 51 degrees after lower dead center. Exhaust valves open 47 degrees before lower dead center and close at top dead center.

**STARTER:**—Model MN-4109. Starter is connected to the engine through an in-board Bendix drive. The direction of rotation is counter-clockwise, viewed from the commutator end. Brush spring tension is 1¼-1½ pounds. Starter switch is Model SW-4002.



# HUPMOBILE

## CENTURY SIX MODEL A (1929)

### AUTO-LITE GENERATING, STARTING SYSTEM AUTO-LITE IGNITION

Starter Data			
Torque	R.P.M.	Volts	Amperes
0 lb. ft.	Free	5.5	50
.7 "	2800	5.5	100
2.9 "	1500	5.0	200
5.5 "	850	4.5	300
8.2 "	420	4.0	400
12.5 "	Lock	3.0	550

**Mounting:**—Starter is flange mounted at left of engine on forward side of flywheel housing. To remove starter, disconnect cable and remove three flange mounting cap screws. Then pull starter forward and lift from place.

**Oiling:**—Put 4 or 5 drops of light engine oil in the oiler on the commutator end of the starter every month or each 1000 miles of operation.

**GENERATOR:**—Model GAJ-4106. The direction of rotation is counter-clockwise, viewed from the commutator end. Generator current regulation is by third brush shunt field. To adjust generator output, remove the commutator cover band and shift the third brush by tapping on the mounting stud with a screwdriver. Shift the third brush in a counter-clockwise direction to increase the charging rate and in the opposite direction to decrease the charging rate. The third brush is held in position by friction between the mounting stud and the end plate. With standard car setting the maximum charging rate is 15 amperes at 8 volts reached at 1600 R.P.M.

Generator Data					
Cold Test			Hot Test		
Amperes	Volts	R.P.M.	Amperes	Volts	R.P.M.
4	6.8	780			
12.4	7.6	1200	11.9	8.0	1800
15	8.0	1600			
14.4	7.8	2000			

Brush spring tension is 2¼-2¾ pounds. Motoring, generator draws 5.5 amperes at 6 volts. Shunt field current is 3 amperes at 6 volts. A five ampere fuse is connected in the field circuit.

**Mounting:**—Generator is mounted at right of engine on rear of timing chain case. To remove generator, disconnect lead and back off timing chain adjustment set screw. Then take out flange mounting cap screws and pull generator to the rear, being careful not to disturb the timing chain.

**Timing Chain Adjustment:**—Timing chain is adjusted by shifting the generator. To take up timing chain, loosen the generator flange mounting screws and turn up the adjustment set screw until the chain begins to hum with the engine running. Then back off adjustment screw until chain runs noiselessly and tighten mounting screws. With proper adjustment there should be one-half inch up and down play in the chain.

**Oiling:**—Put 4 or 5 drops of light engine oil in the generator bearing oiler every two weeks or each 500 miles of operation.

**RELAY:**—Model CB-4012. Relay is mounted on the generator. Relay closes at 650 R.P.M. when the generator voltage reaches 7-7.5 volts and opens with a discharge current of .5-2.5 amperes. Charging current at closing of contacts is approximately 2 amperes. Relay contact gap is .025-.035 inch. Air gap is .010-.030 inch with contacts closed.

**LIGHTING:**—Briggs and Stratton Switch. Lighting switch is mounted at base of steering column. Double filament headlights using a second 21 cp. filament instead of dimmers are standard equipment. Headlights are 6-8 volt, 21-21 cp. D.C. Mazda 1110. Stop and backing light is 6-8 volt, 15 cp. S.C. Mazda 87. Side, dash, dome and tail lights are each 6-8 volt, 3 cp. S.C. Mazda 63.

**FUSES:**—Generator field fuse is 5 ampere capacity. Lighting fuses on junction block are 15 ampere capacity.

# HUPMOBILE

## CENTURY EIGHT MODEL M (1929)

### AUTO-LITE GENERATING, STARTING SYSTEM AUTO-LITE IGNITION

**BATTERY:**—Willard, Type SJRR-4, 6 volt. The positive (+) terminal is grounded. Lighting capacity (20 minute rate) is 125 amperes for 20 minutes. Lighting capacity (5 ampere rate) is 5 amperes for 22 hours. Battery is mounted under the left front seat.

**IGNITION:**—Coil Model IG-4065. Coil is mounted on the dash. Ignition current is 1.5-3 amperes at 6 volts with engine running and 3.4-5 amperes at 6 volts with engine stopped.

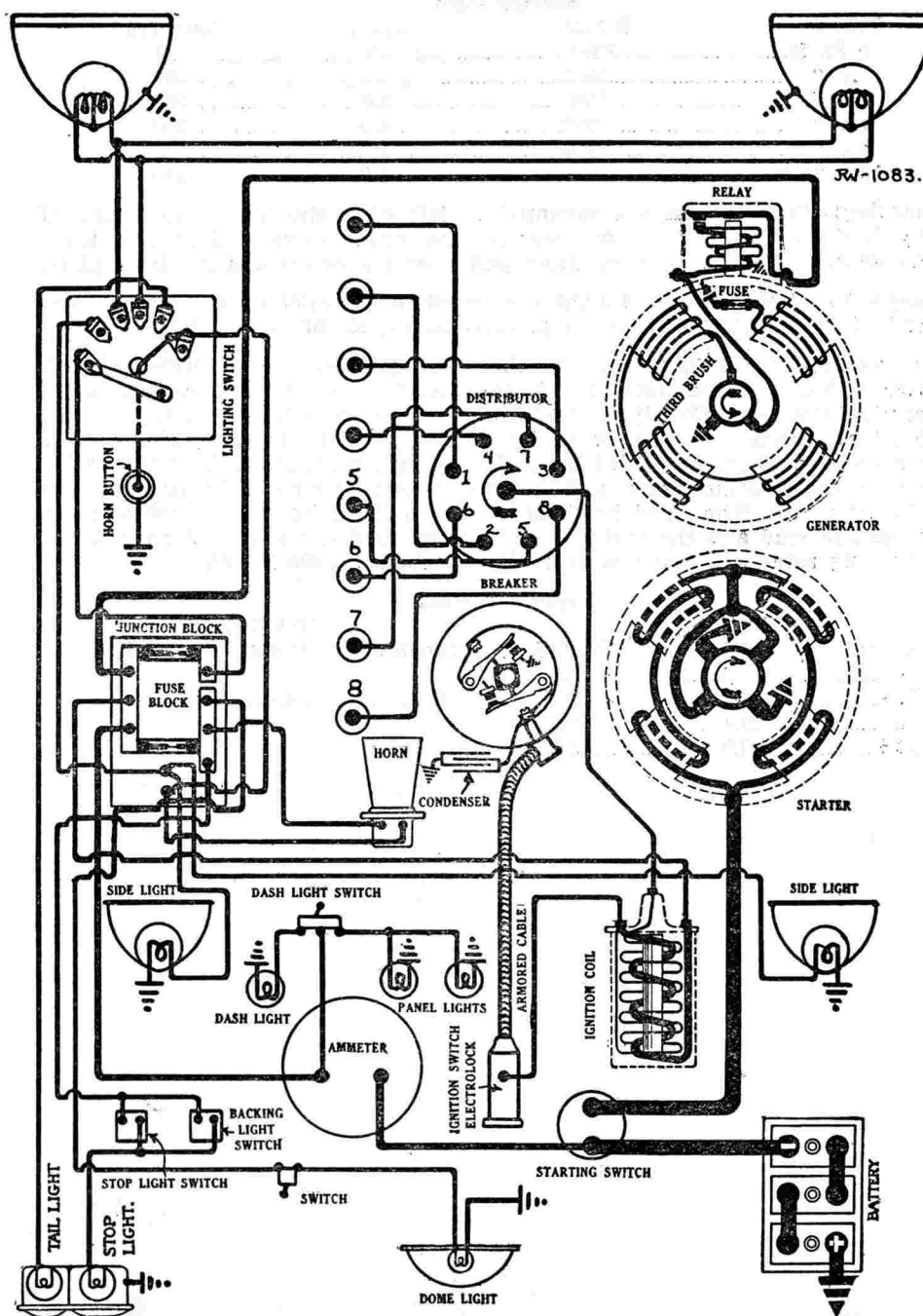
**Distributor Model IGH-4002.** Breaker contacts separate .018-.020 inch. There are two sets of contacts on a four sided cam. Set contact gap on contacts with breaker arm mounted on base plate by loosening the two lock screws on stationary contact mounting plate and turning eccentric adjusting screw until correct gap is secured with breaker arm on lobe of cam. Set the contact gap on the other contacts with breaker arm mounted on movable plate by loosening the lock nut on the stationary contact mounting stud and turning up the stud to secure the correct gap. Resurface contacts when necessary with a fine flat contact file. Breaker arm spring tension is 16-20 ounces. Distributor is semi-automatic. Maximum manual advance is 38 degrees (engine). Automatic advance begins at 800 R.P.M. of engine. Maximum automatic advance is 16 degrees reached at 3600 R.P.M. The two sets of contacts open alternately at intervals of 45 degrees which corresponds with the firing interval of 90 degrees of the engine crankshaft. Contacts must be synchronized for satisfactory ignition performance. See Timing. The ignition switch is a Type 5-A Electrolock.

**Mounting:**—Distributor is mounted at right of engine. The Electrolock must be removed with the distributor as a unit whenever the distributor is taken off the car. To remove distributor, disconnect Electrolock at the dash, disconnect manual spark control and remove distributor head with cables intact. Then take out hold-down screw and lift distributor from place.

**Oiling:**—Put 8 or 10 drops of light engine oil in the oiler on the side of the distributor every two weeks or each 500 miles of operation. Every 1000 miles remove the distributor head and rotor and put a small bit of vaseline on the face of the breaker cam.

**Timing:**—**Synchronization of Contacts.** To synchronize contacts connect a six volt test lamp across the contacts by connecting one lamp lead to the insulated breaker arm terminal inside the distributor case and grounding the other lamp lead to the distributor housing. The lamp will burn when the contacts open and will go out as the contacts close. Then block open the set of contacts with the breaker arm mounted on the stationary base plate. Turn on the ignition. Turn the distributor shaft until the other set of contacts begin to open and the lamp lights. Note the position of the leading line scratched on the tail of the distributor rotor and clip the special synchronizing tool on the edge of the distributor directly opposite this line. Then remove the insulation from between the breaker contacts and block open the other set. Continue to turn distributor shaft until the other line on the rotor (which is just 45 degrees after the first line) is opposite the synchronizing pointer. If the lamp does not light at this point, indicating that the contacts are just opening, loosen the lock screw on the movable base plate and turn the eccentric adjusting screw until the contacts open. The contacts are then properly synchronized.

**Timing Distributor to Engine:**—Breaker contacts begin to separate when the piston entering power stroke reaches a position 9 degrees before top dead center with the manual spark control fully advanced. To set timing,





# HUPMOBILE

## CENTURY EIGHT MODEL M (1929)

### AUTO-LITE GENERATING, STARTING SYSTEM AUTO-LITE IGNITION

crank engine over until piston No. 1 enters compression stroke (the up stroke with both valves closed). Fully advance manual spark control. Continue to crank engine until piston reaches firing position. Then loosen advance arm clamp screw and rotate distributor until one set of contacts begins to open. Tighten the clamp screw and make certain that the segment opposite the rotor is connected to the spark plug in cylinder No. 1.

**Firing Order:**—The firing order is 1-4-7-3-8-5-2-6.

**Spark Plugs:**—Spark plugs are Metric. Gaps are .025 inch.

**VALVE TIMING:**—Head diameter, 1 15/32 inches (inlet) and 1 11/32 inches (exhaust). Valve lift, 11/32 inch. Tappet clearance, .008 inch (cold).

**Timing:**—Inlet valves open 4 degrees after top dead center and close 51 degrees after lower dead center. Exhaust valves open 47 degrees before lower dead center and close at top dead center.

**STARTER:**—Model ML-4139. Starter is connected to the engine through a Bendix drive. The direction of rotation is clockwise, viewed from the commutator end. Brush spring tension is 1 1/4-1 1/2 pounds. Starter cranks the engine at 145 R.P.M. drawing 125 amperes at 5.4 volts.

Starter Data			
Torque	R.P.M.	Volts	Amperes
0 lb. ft.	Free	5.8	70
19 "	Lock	2.5	425

**Mounting:**—Starter is sleeve mounted at right of engine on rear of flywheel case. To remove starter, take up floor boards in front compartment, disconnect cable and remove large pilot mounting screw directly above starter sleeve. Then pull starter to the rear to clear Bendix and lift from place.

**Oiling:**—Starters manufactured after Feb. 1929, are equipped with oilers for commutator end and intermediate bearings. Put 4 or 5 drops of light oil in each oiler every 1000 miles.

**GENERATOR:**—Model GAG-4106. The direction of rotation is counter-clockwise, viewed from the commutator end. Generator current regulation is by third brush shunt field. To adjust generator output, remove the commutator cover band and shift the third brush by tapping on the brush mounting stud with a screwdriver. Shift the third brush in a counter-clockwise direction to increase the charging rate and in the opposite direction to de-

crease the charging rate. The brush is held in position by friction between the mounting stud and the end plate. With standard car setting the maximum charging rate is 17 amperes (cold) at 8 volts reached at 1250 R.P.M.

Generator Data		
Amperes	Volts	R.P.M.
0	6.5	570
5	7.0	730
10	7.3	900
16	8.0	1400

Motoring, generator draws 5-5.5 amperes at 6 volts. Shunt field current is 4.3 amperes at 6 volts. Brush spring tension is 1 1/4-1 1/2 pounds.

**Mounting:**—Generator is flange mounted at right of engine on rear of timing chain case. To remove generator, take off oil filler and cover plate on front of chain case. Disconnect drive shaft at rear of generator. Back off chain adjustment set screw and take out three flange mounting cap screws. Then pull generator to the rear and tie up chain to prevent it slipping on camshaft sprocket.

**Adjustment of Timing Chain:**—Timing chain is adjusted by shifting generator. To take up timing chain, loosen the flange mounting cap screws and turn up adjustment set screw until the chain begins to hum with the engine running. Then back off adjustment screw until chain runs noiselessly and tighten mounting screws.

**Oiling:**—Put 4 or 5 drops of light engine oil in each of the generator oilers every two weeks or each 500 miles of operation.

**RELAY:**—Model CB-4012. Relay is mounted on the generator. Relay closes at 550 R.P.M. when the generator voltage reaches 7-7.5 volts and opens with a discharge current of 5-2.5 amperes. Charging current at closing of contacts is approximately 2 amperes. Relay contact gap is .025-.035 inch. Air gap is .010-.030 inch with contacts closed.

**LIGHTING:**—Briggs and Stratton Switch. Lighting switch is mounted at base of steering column. Double filament headlights using the second 21 cp. filament instead of dimmers are standard equipment. Headlights are 6-8 volt, 21-21 cp. D.C. Mazda 1110. Stop and backing light is 6-8 volt, 15 cp. S.C. Mazda 87. Side, dash, dome and tail lights are each 6-8 volt, 3 cp. S.C. Mazda 63.

**FUSES:**—Generator field fuse is 5 ampere capacity. Lighting fuses mounted on junction block on dash are 15 ampere capacity.

# JORDAN

## MODEL E SIX CYLINDER (1929) SERIAL NUMBERS 95,001 UP

### AUTO-LITE GENERATING, STARTING SYSTEM AUTO-LITE IGNITION

**BATTERY:**—Willard, Type WSB-15, 6 volt. The negative (—) terminal is grounded. Starting capacity (20 minute rate) is 114 amperes for 20 minutes. Lighting capacity (5 ampere rate) is 5 amperes for 20 hours. Battery is mounted under the front seat on the right frame member.

**IGNITION:**—Coil Model IG-4066. Coil is mounted on the generator at the right of the engine. Ignition current is 1.5 amperes at 6 volts with engine running and 4.5 amperes at 6 volts with engine stopped.

**Distributor Model IGB-4006.** Breaker contacts separate .020-.024 inch. Set contact gap by loosening lock screw on stationary contact mounting bracket and turning up contact stud until the correct gap is secured with the breaker arm on the lobe of the cam. Resurface contacts when necessary with a fine flat contact file or on a medium hard oilstone. Breaker arm spring tension is 16-20 ounces. Distributor is semi-automatic. Maximum manual advance is 28 degrees (engine). Automatic advance begins at 400 R.P.M. (engine). Maximum automatic advance is 30 degrees reached at 2800 R.P.M.

**Mounting:**—Distributor is mounted on the rear of the generator at the right of the engine. To remove distributor, disconnect primary lead and manual advance rod and remove distributor head with cables intact. Then remove hold-down screw in advance arm and lift distributor from place.

**Oiling:**—Put 8 or 10 drops of light engine oil in the oiler on the side of the distributor shaft every month or each 1000 miles. Every 1000 miles put a small bit of vaseline on the face of the breaker cam.

**Timing:**—Breaker contacts begin to separate when the piston entering power stroke reaches a position 10 degrees on the flywheel before top dead center with the manual spark control fully advanced. To set timing, crank engine over until piston No. 1 enters compression stroke (the up stroke with both valves closed). Fully advance the spark and remove the cover over the inspection hole in the upper flywheel case on the right side. Continue to crank engine until piston No. 1 reaches a position 10 degrees before top dead center when the flywheel mark 'IGN' will be directly opposite the pointer in the inspection hole. Then loosen advance arm clamp screw and rotate distributor until contacts begin to open. Tighten the clamp screw and connect the segment opposite the rotor to the spark plug in cylinder No. 1. Connect the remaining spark plugs in order 5-3-6-2-4 clockwise around the distributor head.

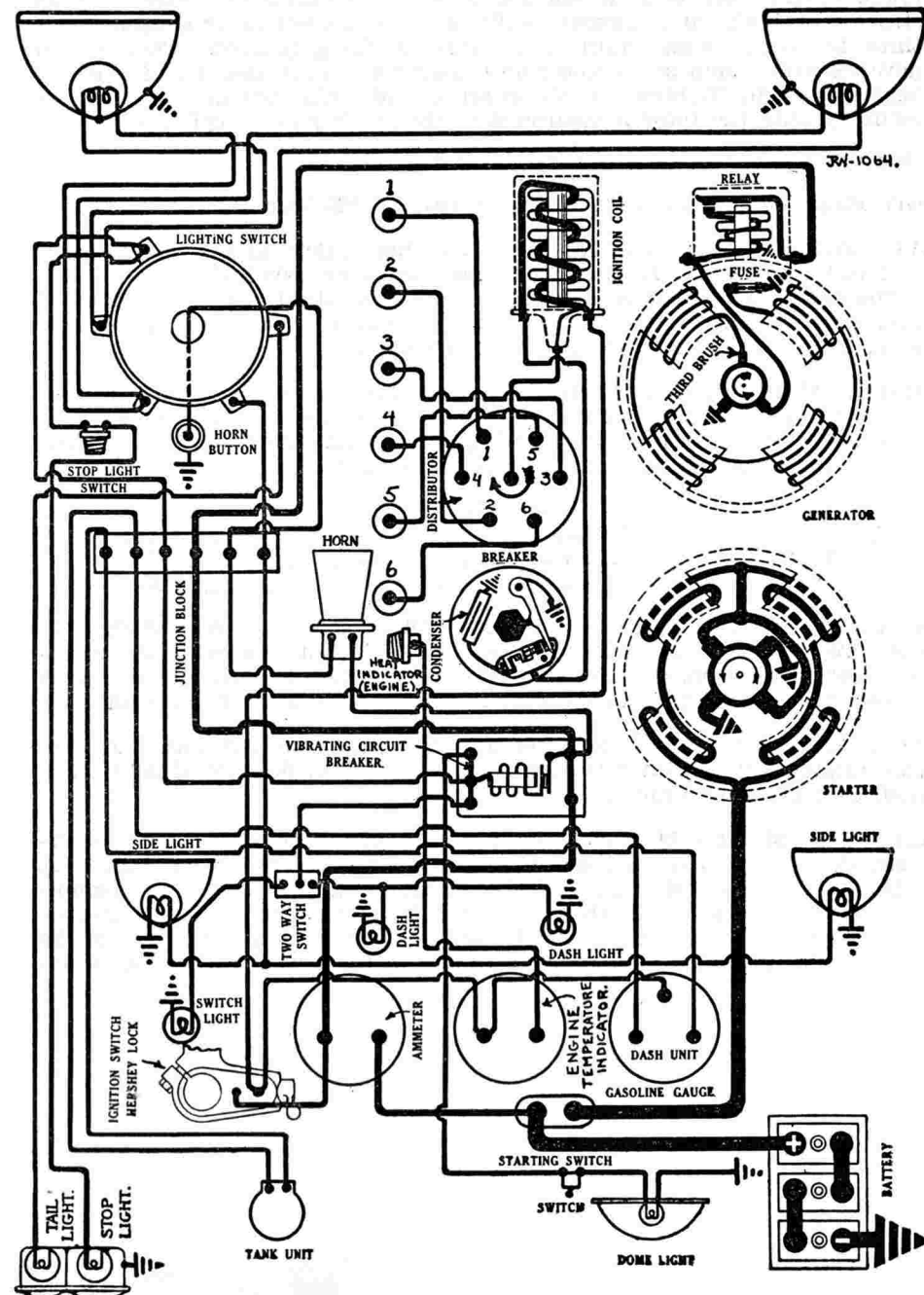
**Firing Order:**—The firing order is 1-5-3-6-2-4.

**Spark Plugs:**—Spark plugs are 18MM. Metric. Gaps are .025 inch.

**VALVE TIMING:**—Specifications:—Head diameter, 1 $\frac{3}{8}$  inches. Stem diameter, .370-.371 inch. Valve lift, .3125 inch. Spring pressure, 98-108 pounds. Tappet clearance, .007 inch (inlet) and .008 inch (exhaust) hot. Valves with over-size stems are made.

**Timing:**—Inlet valves open 5 degrees after top dead center and close 45 degrees after lower dead center. Exhaust valves open 40 degrees before lower dead center and close 8 degrees after top dead center.

**STARTER:**—Model MAB-4104. Starter is connected to the engine through a Bendix drive. The direction of rotation is counter-clockwise, viewed from the commutator end. Starter brush spring tension is 1 $\frac{3}{4}$ -2 $\frac{1}{4}$  pounds.



# JORDAN

## MODEL E SIX CYLINDER (1929) SERIAL NUMBERS 95,001 UP

### AUTO-LITE GENERATING, STARTING SYSTEM

### AUTO-LITE IGNITION

Starter Data			
Torque	R.P.M.	Volts	Amperes
.6 lb. ft.	1900		100
3.5 "	1100		200
6.6 "	700		300
10.2 "	410		400
24 "	Lock		725

**Mounting:**—Starter is flange mounted at the right of the engine on the forward side of the flywheel housing. To remove starter, disconnect cable and remove three flange mounting cap screws. Then pull starter forward to clear Bendix drive and lift from place.

**Oiling:**—Starter bearings are oilless. They require no attention.

**GENERATOR:**—Model GAG-4114. The direction of rotation is counter-clockwise, viewed from the commutator end. Generator current regulation is by third brush shunt field. To adjust generator output, remove the commutator cover band and shift the third brush by tapping on the third brush mounting stud. Shift the third brush in a counter-clockwise direction to increase the charging rate and in the opposite direction to decrease the charging rate. The brush is held in position by friction between the mounting stud and the end plate. With standard car setting, the maximum charging rate is 17 amperes reached at 1350 R.P.M. or 23 miles per hour.

Generator Data		
Amperes	Volts	R.P.M.
2	6.6	525
6	6.9	625
10	7.3	735
14	7.65	900
17	8.0	1350
12	7.45	2125

Motoring, generator draws 4.75-5.25 amperes at 6 volts. Shunt field current is 3.9-4.4 amperes at 6 volts. Brush spring tension is 24-32 ounces. A 7.5 ampere field fuse is mounted on the generator end plate.

**Mounting:**—The generator is flange mounted at the right of the engine on the rear of the timing chain case. The distributor and ignition coil are

mounted on the generator. To remove the generator, disconnect all ignition wiring or remove distributor and coil. Then disconnect generator lead and remove chain inspection cover in chain case cover directly over the generator sprocket. Remove the nut holding the generator sprocket on the armature shaft. Take out flange mounting cap screws and pull generator to the rear, leaving the sprocket in the engine. Tie up the chain to prevent slipping on camshaft sprocket and do not attempt to crank the engine with the generator out.

**Adjustment of Timing Chain:**—Timing chain is adjusted by shifting generator. To take up timing chain, loosen the flange mounting screws and pry the generator away from the engine until the chain begins to hum with the engine running. Then back generator off until chain runs noiselessly and tighten mounting screws. With proper adjustment there should be approximately 1/2 inch up and down play in the chain between the sprockets.

**Oiling:**—Put 4 or 5 drops of light engine oil in the oiler on the commutator end of the generator every month or each 1000 miles. The drive end bearing is oiled from the chain case.

**RELAY:**—Model CB-4012. Relay is mounted on the generator. Relay closes at 620-690 R.P.M. when the generator voltage reaches 7-7.5 volts and opens with a discharge current of 0-2.5 amperes. Charging current at closing of contacts is approximately 2 amperes. Relay contacts separate .025-.035 inch. Air gap is .010-.030 inch with contacts closed.

**LIGHTING:**—Soreng Manegold Switch. Lighting switch is mounted at lower end of steering column. Headlights are equipped with double filament bulbs using the second 21 cp. filament instead of dimmers. Headlights are 6-8 volt, 21-21 cp. D.C. Mazda 1110. Side (cowl) lights are 6-8 volt, 3 cp. S.C. Mazda 63. Stop light is 6-8 volt, 15 cp. S.C. Mazda 87. Dash and tail lights are each 6-8 volt, 3 cp. S.C. Mazda 63.

**CIRCUIT BREAKER:**—A vibrating is mounted on the dash. It is connected in the lighting circuits to protect them against overload. The circuit breaker begins to vibrate at 25-30 amperes and continues limiting the current to 15 amperes.

**FUSES:**—Generator field fuse is 7.5 ampere capacity.



# JORDAN

## MODEL G EIGHT CYLINDER (1929) SERIAL NUMBERS 130,001 UP AUTO-LITE GENERATING, STARTING SYSTEM AUTO-LITE IGNITION

**BATTERY:**—Willard, Type WSB-15, 6 volt. The negative (—) terminal is grounded. Starting capacity (20 minute rate) is 114 amperes for 20 minutes. Lighting capacity (5 ampere rate) is 5 amperes for 20 hours. Battery is mounted on the left frame member under the front seat.

**IGNITION:**—Coil Model IG-4078. (Two used.) Ignition coils are mounted at the right of the engine. Ignition current is 3 amperes at 6 volts with engine running and 9 amperes at 6 volts with engine stopped.

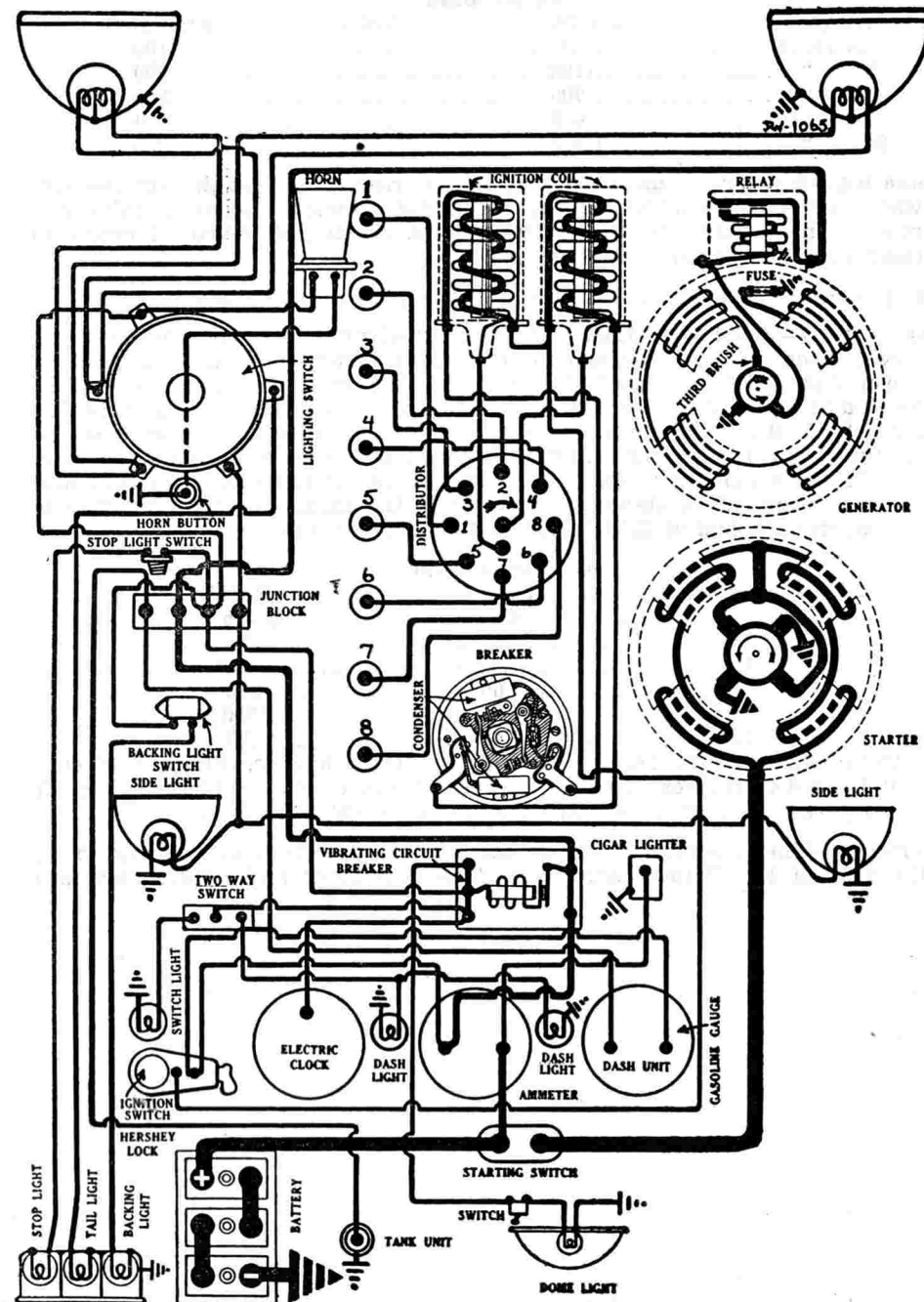
**Distributor Model IGJ-4001-A.** Breaker contacts separate .024 inch with breaker arm on lobe of cam. Set contact gap of breaker mounted on movable plate by loosening lock nut on stationary contact mounting stud and turning up stud until correct gap is secured with breaker arm on lobe of cam. The other set of contacts are set by loosening the lock screw and turning the eccentric adjusting screw directly behind the breaker arm. Breaker arm spring tension is 16-20 ounces. There are two sets of contacts operating on a four sided cam. Contacts open alternately at intervals of 45 degrees corresponding with 90 degrees of crankshaft rotation, which is the correct firing interval. Contacts must be synchronized for correct performance. See Timing. Distributor is semi-automatic. Maximum manual advance is 15 degrees (engine). Maximum automatic advance is 24 degrees (engine).

**Mounting:**—Distributor is mounted on the rear of the generator at the right of the engine. To remove distributor, disconnect manual advance rod and primary leads and remove distributor head with cables intact. Then take out hold-down screw in advance arm and lift distributor from place.

**Oiling:**—Put 8 or 10 drops of light engine oil in the oiler on the side of the distributor every month or each 1000 miles. Every 1000 miles remove the distributor head and rotor and put a small bit of vaseline on the face of the breaker cam.

**Timing:**—**Timing Distributor to Engine.** There are two sets of contacts. Each set of contacts controls one coil and fires four spark plugs. The electrical circuit of each coil is entirely independent. One set of breaker contacts (set mounted on stationary base plate) open when piston No. 1 entering power stroke reaches a position 10 degrees before top dead center when the flywheel mark 'IGN' will be directly opposite the indicator in the inspection hole in the right side of the flywheel case. The manual spark control must be in the fully advanced position with the distributor rotated counter-clockwise as far as possible. To set timing, crank engine over until piston No. 1 reaches firing position. Fully advance spark lever. Then loosen advance arm clamp screw and rotate distributor in a counter-clockwise direction until the contacts begin to open. Tighten the clamp screw. Connect the segment in the distributor head directly opposite the rotor contact which is connected to the center terminal in the distributor head to the spark plug in cylinder No. 1. The remaining spark plugs should be connected in order 3-2-4-8-6-7-5 clockwise around the distributor head (see diagram). The second set of contacts must be synchronized after the distributor has been timed to the engine.

**Synchronization of Contacts:**—Crank the engine over exactly 90 degrees from firing position of piston No. 1 (after distributor has been timed) when piston No. 6 will reach a position 10 degrees before top dead center with the flywheel mark 'IGN' directly opposite the indicator in the inspection hole. If the second set of contacts are not separating, loosen the two lock screws on the breaker plate and turn the eccentric adjusting screw until the contacts open. Tighten the lock screws. Test lamps should be connected in



# JORDAN

## MODEL G EIGHT CYLINDER (1929) SERIAL NUMBERS 130,001 UP

### AUTO-LITE GENERATING, STARTING SYSTEM

### AUTO-LITE IGNITION

each primary circuit to determine when contacts open. It is impossible to determine this point with sufficient accuracy by other means.

**Firing Order:**—The firing order is 1-6-2-5-8-3-7-4. Spark plugs are connected 1-3-2-4-8-6-7-5 clockwise around the distributor head.

**Spark Plugs:**—Spark plugs are 18MM. Metric. Gaps are .030 inch.

**VALVE TIMING:**—**INLET VALVES:**—Head diameter, 1½ inches. Stem diameter, .3095-.3085 inch. Valve lift, .312-.316 inch. Spring pressure, 102-106 pounds. Tappet clearance, .007 inch (hot). Inlet valves open 8 degrees after top dead center and close 40 degrees after lower dead center.

**EXHAUST VALVES:**—Head diameter, 1¾ inches. Stem diameter, .3095-.3085 inch. Valve lift, .312-.316 inch. Spring pressure, 100-106 pounds. Tappet clearance, .008 inch (hot). Exhaust valves open 40 degrees before lower dead center and close 8 degrees after top dead center.

**STARTER:**—Model MUA-4007. Starter is connected to the engine through a Bendix drive. The direction of rotation is clockwise, viewed from the commutator end. Brush spring tension is 1½ pounds.

Starter Data			
Torque	R.P.M.	Volts	Amperes
0 lb. ft.	4200	6	50
2 "	1500	5.3	130
4 "	1000	5.0	200
6 "	600	4.6	275
8 "	450	4.2	340
22 "	Lock	3.6	480

**Mounting:**—Starter is flange mounted at left of engine on forward side of the rear motor support. To remove starter, disconnect cable and remove flange mounting cap screws. Then pull starter forward to clear Bendix drive and lift from place.

**Oiling:**—Starter bearings are oilless. They require no attention.

**GENERATOR:**—Model GAG-4109. The direction of rotation is counter-clockwise, viewed from the commutator end. Generator current regulation is by third brush shunt field. To adjust generator output, remove the commutator cover band and shift the third brush by tapping on the third brush mounting stud with a screw driver. Shift the third brush in a counter-clockwise direction to increase the charging rate and in the opposite direction to decrease the charging rate. The third brush is held in position by friction between the mounting stud and the end plate. With standard car setting, the maximum charging rate is 18 amperes reached at 1400 R.P.M. or 23-24 miles per hour.

Generator Data		
Amperes	Volts	R.P.M.
0	6.4	475
4	6.75	575
8	7.1	700
12	7.45	850
16	7.8	1050
18	8.0	1300

Motoring, generator draws 4.75-5.25 amperes at 6 volts. Shunt field current is 3.9-4.4 amperes at 6 volts. Brush spring tension is 24-32 ounces. A 7.5 ampere field fuse is connected in the field circuit. The fuse is mounted on the generator end plate.

**Mounting:**—Generator is mounted at right of engine on rear of timing chain case. To remove generator, disconnect all ignition wiring or remove distributor. Then remove inspection cover on front of chain case and take off nut on end of generator shaft. Then loosen chain adjustment set screw and take out flange mounting cap screws. Pull the generator to the rear and lift from place. Tie up the timing chain and do not attempt to crank engine with generator out.

**Timing Chain Adjustment:**—To adjust tension of timing chain, loosen the flange mounting cap screws and turn up the adjusting set screw until the chain begins to hum with the engine running. Then back off the set screw until the chain runs noiselessly and tighten the mounting screws.

**Oiling:**—Put 4 or 5 drops of light engine oil in the generator bearing oiler every month or each 1000 miles.

**RELAY:**—Model CB-4012. Relay is mounted on the generator. Relay contacts close at 7-8 M.P.H. or 550 R.P.M. of the generator armature when the voltage reaches 6.75 volts and open with a discharge current of ½-2½ amperes. Charging current at closing of contacts is approximately 3 amperes. Relay contacts open .030 inch. Air gap is .010-.030 inch with contacts closed.

**LIGHTING:**—Soreng Manegold Switch. Lighting switch is mounted at the lower end of the steering column. Double filament headlights are standard equipment. These headlights use a second 21 cp. filament instead of dimmers. Headlights are 6-8 volt, 21-21 cp. D.C. Mazda 1110. Side (cowl) lights are 6-8 volt, 3 cp. S.C. Mazda 63. Stop light is 6-8 volt, 15 cp. S.C. Mazda 87. Dash lights (ignition switch and instrument board lights) and tail light are each 6-8 volt, 3 cp. S.C. Mazda 63.

**FUSES:**—Generator field fuse is 7.5 ampere capacity.

**CIRCUIT BREAKER:**—A vibrating circuit breaker mounted on the dash is connected in the lighting circuits. Circuit breaker begins to vibrate when the current reaches 25-30 amperes and continues limiting the current to 15 amperes.

# KISSEL

## MODEL 6-73, SERIAL NOS. 73-1000 UP

### PRODUCTION STARTED AUGUST 15, 1928

### DELCO-REMY GENERATING, STARTING SYSTEM

### DELCO-REMY IGNITION

**BATTERY:**—Willard, Type CWR-13, 6 volt. The positive (+) terminal is grounded. Starting capacity (20 minute rate) is 98 amperes for 20 minutes. Lighting capacity (5 ampere rate) is 5 amperes for 16.8 hours. The battery is cradle mounted under the front seat.

**IGNITION:**—Coil Model 528-C. Distributor Model 640-L. Breaker contacts separate .018-.024 inch with breaker arm on lobe of cam. Resurface contacts with a fine flat contact file or on a medium hard oilstone. Adjust contact gap by loosening lock screw on stationary contact plate and shifting plate by turning eccentric adjusting screw until proper contact is secured. Breaker arm spring tension is 17-21 ounces. Distributor is semi-automatic. Manual advance is 15 degrees (engine). Automatic advance begins at 400 R.P.M. of engine and reaches the maximum of 20 degrees at 2200 R.P.M.

**Mounting:**—Coil is mounted on the dash. Distributor is mounted on the cylinder head with a SAE Type B mounting. To remove the distributor, disconnect primary lead and manual advance rod. Remove distributor head with high tension cables intact. Loosen the hold-down screw and lift distributor from place.

**Oiling:**—Fill the grease cup on the side of the distributor shaft with medium cup grease and turn down one turn every 500 miles. Put a small bit of vaseline on the face of the breaker cam and a drop of light engine oil on the breaker arm pivot every 1000 miles. Put a few drops of light engine oil in the wick oiler under the rotor every 2000 miles.

**Timing:**—Breaker contacts separate when the piston entering power stroke reaches a position 10 degrees after top dead center (measured on the flywheel) with the spark control in the fully retarded position. To check timing, crank engine over until piston No. 1 is coming up on the compression stroke. This is the up stroke with both valves closed. Fully retard the spark. Continue to crank the engine until piston reaches the firing position when the ignition mark '1&6' on the flywheel will be 10 degrees past the indicator on the flywheel housing. Breaker contacts should separate at this point. If they do not, loosen the clamp screw on the side of the distributor mounting and rotate distributor until contacts separate. Tighten the screw. Make certain that the rotor is opposite the segment connected to the spark plug in cylinder No. 1 and connect the remaining plugs in order 5-3-6-2-4 around the distributor head.

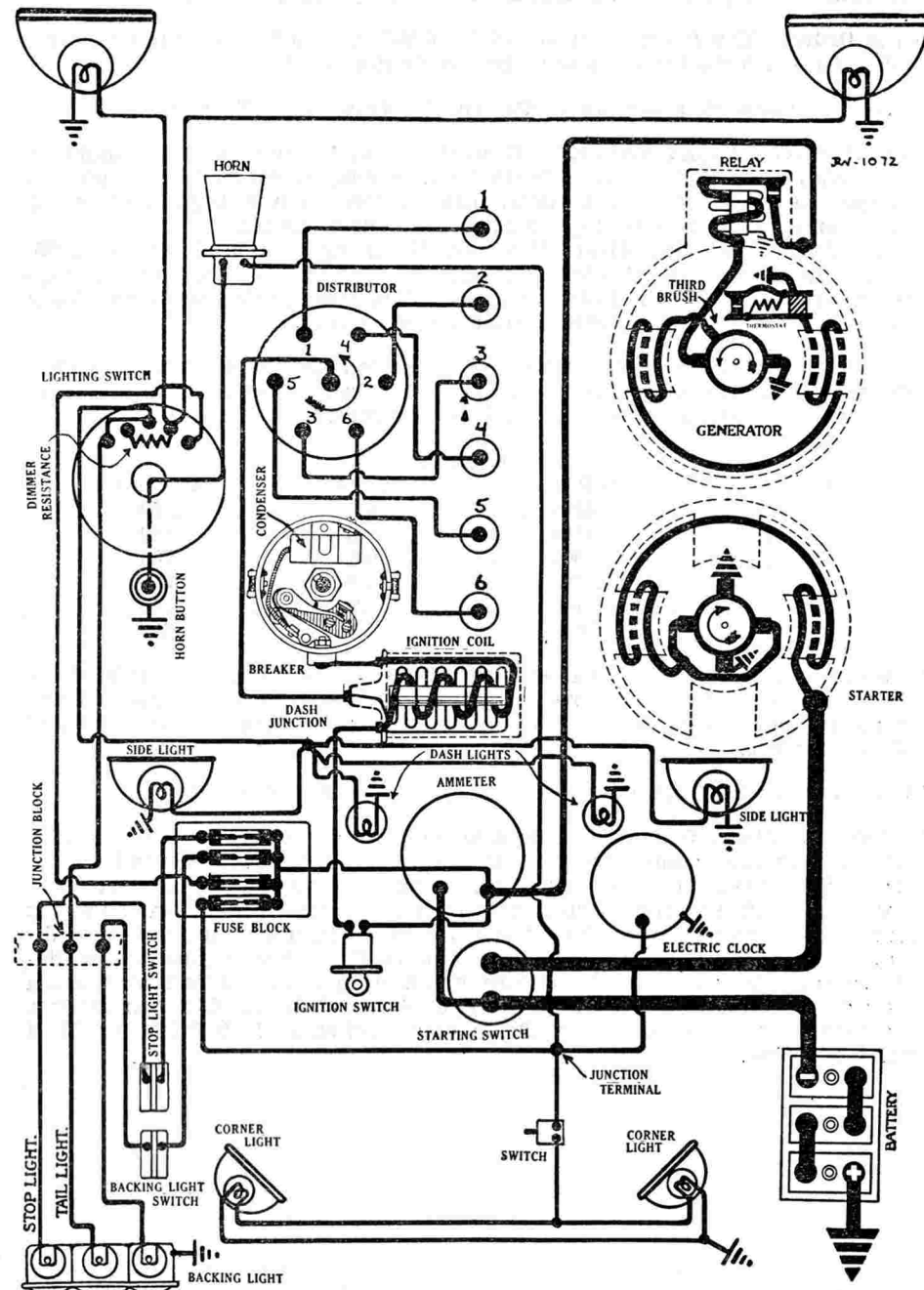
**Firing Order:**—The firing order is 1-5-3-6-2-4. No. 1 cylinder nearest the radiator.

**Spark Plugs:**—Spark plugs are  $\frac{7}{8}$ -18 Long. Gaps are .030 inch.

**VALVE TIMING:**—**INLET VALVES:**—Head diameter, 1  $\frac{17}{32}$  inches. Stem diameter, .342 inch. Stem length, 5  $\frac{15}{16}$  inches. Tappet clearance, .008 inch (hot). Spring pressure, 85 pounds. Valve lift, 11/32 inch. Inlet valves open at top dead center and close 54 degrees after lower dead center.

**EXHAUST VALVES:**—Head diameter, 1  $\frac{13}{32}$  inches. Stem diameter, .342 inch. Stem length, 5  $\frac{15}{16}$  inches. Tappet clearance, .008 inch (hot). Spring pressure, 85 pounds. Valve lift, 11/32 inch. Exhaust valves open at 50 degrees before lower dead center and close 10 degrees after top dead center. Valve stem guides are removable. Oversize valves are not made.

**STARTER:**—Model 716-A. Starter is connected to the engine through a Bendix drive. The direction of rotation is clockwise, viewed from the commutator





# KISSEL

MODEL 6-73, SERIAL NOS. 73-1000 UP  
PRODUCTION STARTED AUGUST 15, 1928  
DELCO-REMY GENERATING, STARTING SYSTEM  
DELCO-REMY IGNITION

end. Starter cranks the engine at 150 R.P.M. drawing 175 amperes at 4.5 volts. Brush spring tension is 24-28 ounces.

Starter Data			
Torque	R.P.M.	Volts	Amperes
Free	3000	5.0	70
15 lb. ft.	Lock	3.7	450

**Mounting:**—Starter is mounted with a SAE No. 1 flange mounting on the right of the engine on the forward side of the flywheel housing. To remove starter, disconnect cable and remove flange mounting cap screws. Then pull starter forward and lift from place.

**Oiling:**—Put 8-10 drops of light engine oil in the oiler on the commutator end of the starter every 1000 miles. The drive end bearing is oilless and requires no attention. Every six months remove the plug in the reduction gear case and repack the gear compartment with graphite grease.

**GENERATOR:**—Model 955-H. The direction of rotation is counter-clockwise, viewed from the commutator end. Generator current regulation is by third brush shunt field and thermostat. Thermostat contacts open at 160 degrees F. cutting a resistance in the field circuit and reducing the output approximately 40%. To adjust the generator output, remove the commutator cover band and loosen the small round headed screw on the generator end plate. Then shift the third brush in a counter-clockwise direction to increase the charging rate and in the opposite direction to decrease the charging rate. Tighten the screw after making the adjustment. With standard car setting, the maximum charging rate is 18-19 amperes (cold) reached at 1450 R.P.M. or 25-26 M.P.H.

Generator Data					
Cold Test			Hot Test		
Amperes	Volts	R.P.M.	Amperes	Volts	R.P.M.
19-21	8.35-8.5	1450	9-12	7.35-7.65	1800-2000

Motoring freely, generator draws 5 amperes at 6 volts. Shunt field current is 4-6.1 amperes at 6 volts. Brush spring tension is 14-18 ounces.

**Mounting:**—Generator is mounted at right of engine on special swinging bracket and is belt driven from the engine crankshaft. The water pump is mounted directly on the rear of the generator and is driven by the generator shaft. To remove generator, first drain the radiator and remove the water pump hose connections. Then take out adjustment clamp bolt and swing generator toward the engine. Slip off the drive belt. Take out the two bolts mounting the generator on the bracket and lift the generator and water pump from place. The water pump can be removed by taking out the cap screws which mount the pump on the generator bosses.

**Belt Adjustment:**—To tighten drive belt, loosen the adjustment clamp bolt and swing the generator away from the engine until the correct belt tension is secured. Tighten the clamp bolt. Do not tighten the drive belt more than is necessary to secure positive drive without slipping or the belt will crowd the generator bearings.

**Oiling:**—Put 8-10 drops of light engine oil in each of the generator oilers every month or each 1000 miles.

**RELAY:**—Model 265-B. Relay is mounted on top of the generator. Relay closes when the voltage of the generator reaches 7-7.5 volts and opens with a discharge current of 0-2.5 amperes. Charging current at closing of contacts is approximately 3 amperes. Relay contacts separate .015-.025 inch. Air gap between relay armature and coil core is .012-.017 inch.

**LIGHTING:**—Briggs and Stratton Switch. Switch is mounted at the lower end of the steering column on the frame. Dimming is by resistance. Headlights are 6-8 volt, 32 cp. S.C. Mazda 1133. Side lights are 6-8 volt, 3 cp. S.C. Mazda 63. Dash and dome lights are 6-8 volt, 3 cp. D.C. Mazda 64. Tail, stop and backing lights are 6-8 volt, 3 cp. S.C. Mazda 63. Corner lights are 6-8 volt, 3 cp. D.C. Mazda 64.

**FUSES:**—Fuses are mounted on the dash. They are 10 ampere capacity.

# KISSEL

MODEL 8-95, SERIAL NOS. 95-1000 UP  
PRODUCTION STARTED AUGUST 15, 1928  
DELCO-REMY GENERATING, STARTING SYSTEM  
DELCO-REMY IGNITION

**BATTERY:**—Willard, Type SJWR-4, 6 volt. The positive (+) terminal is grounded. Starting capacity (20 minute rate) is 125 amperes for 20 minutes. Lighting capacity (5 ampere rate) is 5 amperes for 22 hours. The battery is cradle mounted under the front seat.

**IGNITION:**—Coil Model 528-C. Distributor Model 658-L. Breaker contacts separate .018-.024 inch with breaker on lobe of cam. Resurface contacts with a fine flat contact file or on a medium hard oilstone. Set contact gap by loosening the set screw on the stationary contact plate and turning the eccentric adjusting screw until proper contact is secured. Breaker arm spring tension is 17-21 ounces. Breaker uses two sets of contacts on a single four sided cam. Contacts open alternately at intervals of 45 degrees corresponding to 90 degrees of crankshaft rotation. This is the correct firing interval for the Kissel engine and breaker must be accurately set. See Timing. Distributor is semi-automatic. Manual advance is 15 degrees. Automatic advance begins at 400 R.P.M. Maximum automatic advance is 22 degrees reached at 3000 R.P.M. of engine.

**Mounting:**—Coil is mounted on the dash. Distributor is mounted on the cylinder head with a SAE Type B mounting. To remove the distributor, disconnect primary lead and manual advance rod. Remove distributor head with high tension cables intact. Loosen mounting stud clamp screw and lift distributor from place.

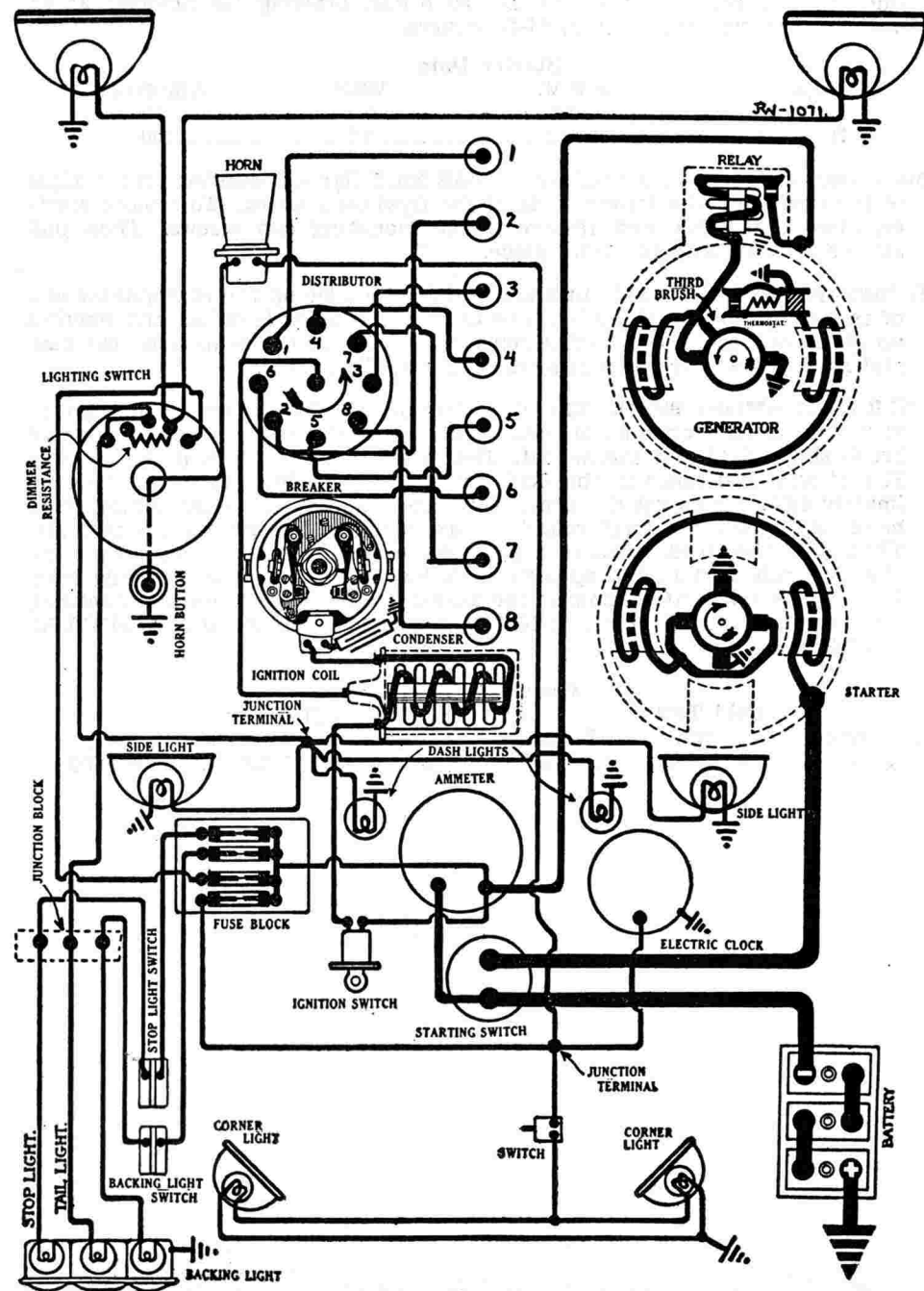
**Oiling:**—Fill the grease cup on the side of the distributor shaft with medium cup grease and turn down one turn every 500 miles. Put a small bit of vaseline on the face of the breaker cam and a drop of light engine oil on the breaker arm pivot every 1000 miles. Put a few drops of light engine oil in the wick oiler under the rotor every 2000 miles.

**Timing:**—Synchronization of Contacts:—Use Delco-Remy Tool, Part No. 820738 and follow directions on Page S-31 to synchronize contacts. Synchronization can also be checked after distributor is timed to engine by cranking engine over 90 degrees from firing position of piston No. 1 when piston No. 6 will enter power stroke. If second set of contacts do not separate at this point with manual advance rod in the fully retarded position, loosen lock screw on breaker plate and turn eccentric adjusting screw until contacts open. Check contact opening after synchronization. If not within the limits of .018-.024 inch, reset at .022 inch and repeat synchronizing operation.

**Timing Distributor to Engine:**—Breaker contacts begin to separate when piston entering power stroke reaches a position 10 degrees past top dead center (measured on the flywheel) with the manual advance control in the fully retarded position. To set timing, crank engine over until piston No. 1 is coming up on the compression stroke. This is the up stroke with both valves closed. Fully retard the spark. Continue to crank engine until the ignition mark '1&8' is  $\frac{3}{4}$  inch or 10 degrees after top dead center on the flywheel when the mark 'Time' will be opposite the indicator on the flywheel housing. Breaker contacts should separate at this point. If they do not, loosen the advance arm clamp screw and rotate distributor until contacts separate. Tighten the clamp screw and make certain that the rotor is opposite the segment connected to the spark plug in cylinder No. 1 and connect the remaining plugs in order 6-2-5-8-3-7-4 around the distributor head.

**Firing Order:**—The firing order is 1-6-2-5-8-3-7-4. No. 1 cylinder nearest the radiator.

**Spark Plugs:**—Spark plugs are  $\frac{7}{8}$ -18 Long. Gaps are .030 inch.



# KISSEL

MODEL 8-95, SERIAL NOS. 95-1000 UP  
PRODUCTION STARTED AUGUST 15, 1928  
DELCO-REMY GENERATING, STARTING SYSTEM  
DELCO-REMY IGNITION

**VALVE TIMING:**—INLET VALVES:—Head diameter, 1 17/32 inches. Stem diameter, .342 inch. Stem length, 5 15/16 inches. Tappet clearance, .008 inch (hot). Spring pressure, 85 pounds. Valve lift, 11/32 inch. Inlet valves open at top dead center and close at 45 degrees after lower dead center.

EXHAUST VALVES:—Head diameter, 1 13/32 inches. Stem diameter, .342 inch. Stem length, 5 15/16 inches. Tappet clearance, .008 inch (hot). Spring pressure, 85 pounds. Valve lift, 11/32 inch. Exhaust valves open at 50 degrees before lower dead center and close 10 degrees after top dead center. Valve stem guides are removable. Oversize valves are not made.

**STARTER:**—Model 716-A. Starter is connected to the engine through a Bendix drive. The direction of rotation is clockwise, viewed from the commutator end. Starter cranks the engine at 150 R.P.M. drawing 175 amperes at 4.5 volts. Brush spring tension is 24-28 ounces.

Starter Data			
Torque	R.P.M.	Volts	Amperes
Free	3000	5.0	70
15 lb. ft.	Lock	3.7	450

**Mounting:**—Starter is mounted with a SAE No. 1 flange mounting on the right of the engine on the forward side of the flywheel housing. To remove starter, disconnect cable and remove flange mounting cap screws. Then pull starter forward and lift from place.

**Oiling:**—Put 8-10 drops of light engine oil in the oiler on the commutator end of the starter every 1000 miles. The drive end bearing is oilless and requires no attention. Every six months remove the plug in the reduction gear case and repack the gear compartment with graphite grease.

**GENERATOR:**—Model 955-H. The direction of rotation is counter-clockwise, viewed from the commutator end. Generator current regulation is by third brush shunt field and thermostat. Thermostat contacts open at 160 degrees F. cutting a resistance in the field circuit and reducing the output approximately 40%. To adjust the generator output, remove the commutator cover band and loosen the small round headed screw on the generator end plate. Then shift the third brush in a counter-clockwise direction to increase the charging rate and in the opposite direction to decrease the charging rate. Tighten the screw after making the adjustment. With standard car setting,

the maximum charging rate is 18-19 amperes (cold) reached at 1450 R.P.M. or 25-26 M.P.H.

Generator Data					
Cold Test			Hot Test		
Amperes	Volts	R.P.M.	Amperes	Volts	R.P.M.
19-21	8.35-8.5	1450	9-12	7.35-7.65	1800-2000

Motoring freely, generator draws 5 amperes at 6 volts. Shunt field current is 4-6.1 amperes at 6 volts. Brush spring tension is 14-18 ounces.

**Mounting:**—Generator is mounted at right of engine on special swinging bracket and is belt driven from the engine crankshaft. The water pump is mounted directly on the rear of the generator and is driven by the generator shaft. To remove generator, first drain the radiator and remove the water pump hose connections. Then take out adjustment clamp bolt and swing generator toward the engine. Slip off the drive belt. Take out two bolts mounting generator on bracket and lift generator and water pump from the engine.

**Belt Adjustment:**—To adjust belt tension, loosen the adjustment clamp screw and swing generator away from the engine until the correct belt tension is secured. Tighten the clamp bolt. Do not tighten the drive belt more than is necessary or it will crowd the generator bearings.

**Oiling:**—Put 8-10 drops of light engine oil in each of the generator oilers every month or each 1000 miles.

**RELAY:**—Model 265-B. Relay is mounted on top of the generator. Relay closes when the voltage of the generator reaches 7-7.5 volts and opens with a discharge current of 0-2.5 amperes. Charging current at closing of contacts is approximately 3 amperes. Relay contacts separate .015-.025 inch. Air gap between relay armature and coil core is .012-.017 inch.

**LIGHTING:**—Briggs and Stratton Switch. Switch is mounted at the lower end of the steering column on the frame. Dimming is by resistance. Headlights are 6-8 volt, 32 cp. S.C. Mazda 1133. Side lights are 6-8 volt, 3 cp. S.C. Mazda 63. Dash, dome and corner lights are 6-8 volt, 3 cp. D.C. Mazda 64. Tail, stop and backing lights are 6-8 volt, 3 cp. S.C. Mazda 63.

**FUSES:**—Fuses are mounted on the dash. They are 10 ampere capacity.



# KISSEL

**MODEL 8-126, SERIAL NOS. 126-1001 UP**  
**PRODUCTION STARTED AUGUST 15, 1928**  
**DELCO-REMY GENERATING, STARTING SYSTEM**  
**DELCO-REMY IGNITION**

**BATTERY:**—Willard, Type SJWR-4, 6 volt. The positive (+) terminal is grounded. Starting capacity (20 minute rate) is 125 amperes for 20 minutes. Lighting capacity (5 ampere rate) is 5 amperes for 22 hours. The battery is cradle mounted under the front seat.

**IGNITION:**—Coil Model 528-C. Distributor Model 668-B. Breaker has two sets of contacts on a single four sided cam opening alternately at intervals of 45 degrees corresponding to 90 degrees of crankshaft rotation. This firing interval is important and must be correctly set. See Timing. Breaker contacts separate .018-.024 inch with breaker arm on lobe of cam. Resurface contacts with a fine flat contact file or on a medium hard oilstone. To adjust contact opening, loosen the lock screws on the stationary contact plates and turn the eccentric adjusting screws until proper setting is secured. Tighten the lock screws. Breaker arm spring tension is 17-21 ounces. Distributor is semi-automatic. Manual advance is 15 degrees (engine). Automatic advance begins at 800 R.P.M. Maximum automatic advance is 15 degrees reached at 4200 R.P.M. of engine.

**Mounting:**—Coil is mounted on the dash. Distributor is mounted on the cylinder head with a SAE Type B mounting. To remove distributor, disconnect primary lead and manual advance rod. Remove distributor head with high tension cables intact. Loosen mounting stud clamp screw and lift distributor from place.

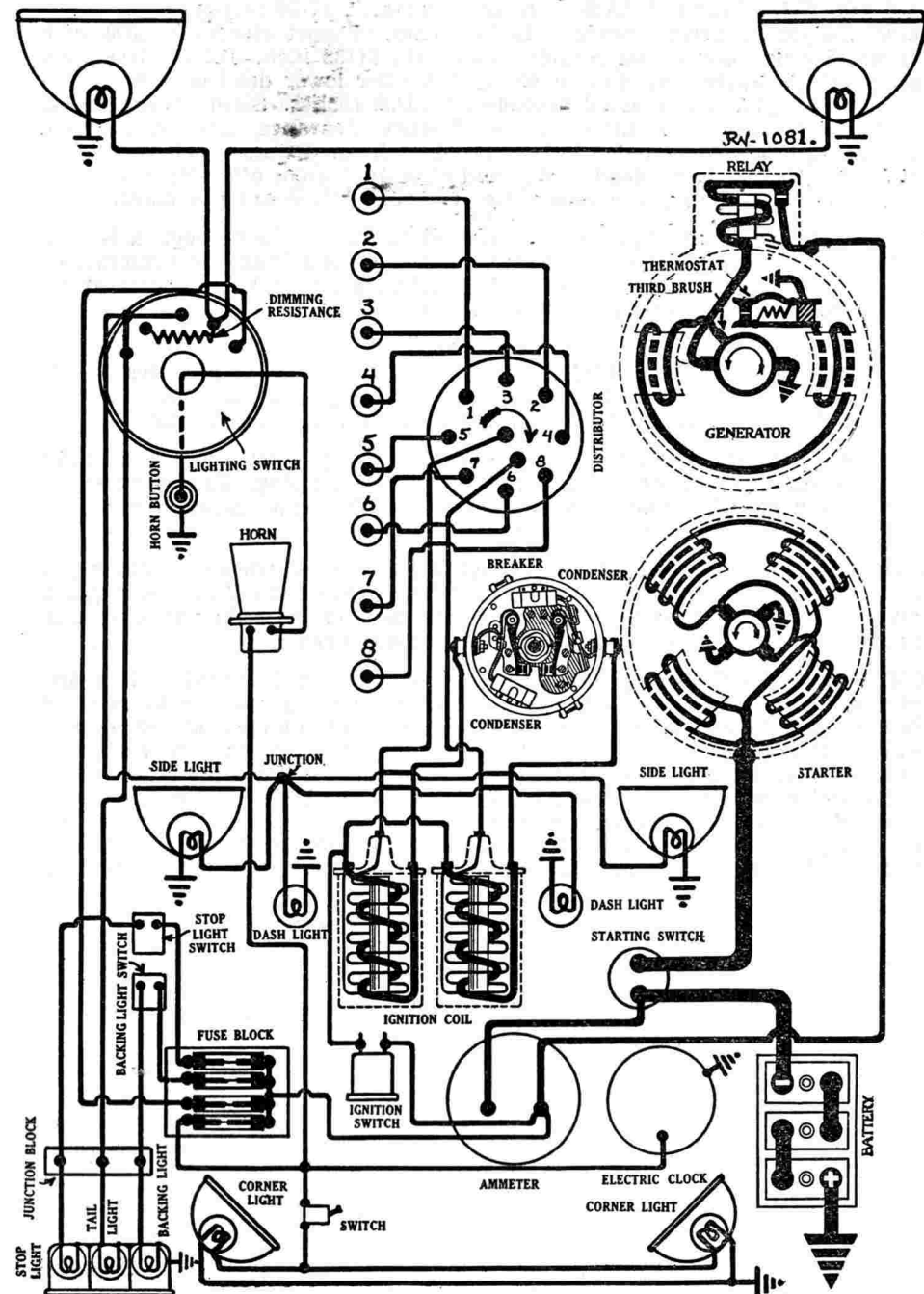
**Oiling:**—Fill the grease cup on the side of the distributor shaft with medium cup grease and turn down one turn every 500 miles. Put a small bit of vaseline on the face of the breaker cam and a drop of light engine oil on the breaker arm pivots every 1000 miles. Put a few drops of light engine oil in the wick orler under the rotor every 2000 miles.

**Timing:**—Each set of contacts controls one coil and fires 4 spark plugs. The electrical circuit of each set of contacts is entirely separate. One set of contacts begins to separate when the piston entering power stroke reaches a position 10 degrees past top dead center with the breaker assembly fully retarded. To set timing, crank engine over until piston No. 1 is coming up on the compression stroke. This is the up stroke with both valves closed. Fully retard the spark. Continue to crank engine until the flywheel mark '1&8' is  $\frac{3}{4}$  inch past top dead center when the ignition mark 'Time' should be opposite the indicator on the flywheel housing. One set of contacts should be opening at this point. If it is not, loosen the advance arm clamp bolt and rotate the distributor until contacts separate. Tighten the clamp bolt and crank engine over 90 degrees when the second set of contacts should open. If they do not, loosen the lock screw on the breaker plate and turn the eccentric adjusting screw until contacts separate. Tighten the lock screw and check contact gap. If outside .018-.024 inch, reset at .022 inch and repeat operation.

**Firing Order:**—The firing order is 1-6-2-5-8-3-7-4. No 1 cylinder nearest the radiator.

**Spark Plugs:**—Spark plugs are  $\frac{7}{8}$ -18 Long. Gaps are .030 inch.

**VALVE TIMING:**—INLET VALVES:—Head diameter,  $1\frac{1}{8}$  inches. Stem diameter,  $11/32$  inch. Stem length,  $5\frac{1}{2}$  inches. Tappet clearance, .008 inch (hot). Spring pressure, 85 pounds. Valve lift,  $11/32$  inch. Inlet valves open at top dead center and close 45 degrees after lower dead center.



# KISSEL

MODEL 8-126, SERIAL NOS. 126-1001 UP  
PRODUCTION STARTED AUGUST 15, 1928  
DELCO-REMY GENERATING, STARTING SYSTEM  
DELCO-REMY IGNITION

**EXHAUST VALVES:**—Head diameter, 1½ inches. Stem diameter, 11/32 inch. Stem length, 5½ inches. Tappet clearance, .008 inch (hot). Spring pressure, 85 pounds. Valve lift, 11/32 inch. Exhaust valves open 50 degrees before lower dead center and close 10 degrees after top dead center. Valve stem guides are removable. Oversize valves are not made.

**STARTER:**—Model 720-Q. Starter is connected to the engine through a Bendix drive. The direction of rotation is counter-clockwise, viewed from the commutator end. Starter cranks the engine at 150 R.P.M. drawing 175 amperes at 4.5 volts. Starter switch is Model 406-A. Brush spring tension is 24-28 ounces.

Starter Data			
Torque	R.P.M.	Volts	Amperes
Free	6000	5.0	65
15 lb. ft.	Lock	3.15	570

**Mounting:**—Starter is mounted with a SAE No. 1 flange mounting at the right of the engine on the forward side of the flywheel housing. To remove starter, disconnect cable and remove flange mounting studs. Then pull starter forward and out.

**Oiling:**—Put 8 or 10 drops of light engine oil in each of the starter oilers every month or each 1000 miles.

**GENERATOR:**—Model 941-W. The direction of rotation is counter-clockwise, viewed from the commutator end. Generator current regulation is by third brush shunt field and thermostat. Thermostat contacts open at 165 degrees F. cutting the resistance across the thermostat contacts in series and reducing the output approximately 40%. To adjust generator output, loosen the small round headed screw on the generator end plate and remove the commutator cover band. Shift the third brush in a counter-clockwise direc-

tion to increase the charging rate and in the opposite direction to decrease the charging rate. Tighten the screw after making the adjustment.

## Generator Data

Cold Test			Hot Test		
Amperes	Volts	R.P.M.	Amperes	Volts	R.P.M.
19-21	8.35	1450	9-12	7.35-7.65	1800-2000

Motoring, generator draws 6 amperes at 6 volts. Shunt field current is 4-6.1 amperes at 6 volts. Brush spring tension is 14-18 ounces.

**Mounting:**—Generator is base mounted at right of engine and is driven by an extension of the water pump shaft. To remove generator, disconnect lead and drive coupling and take out base mounting bolts. Then lift generator from place.

**Oiling:**—Put 8 or 10 drops of light engine oil in each of the generator oilers every month or each 1000 miles.

**RELAY:**—Model 265-B. Relay contacts close at approximately 575 R.P.M. of the armature when the voltage of the generator reaches 6.75-7 volts. The charging current at closing of contacts must not exceed 3 amperes. Discharge current at opening of contacts is 0-2.5 amperes. Relay contacts separate .015-.025 inch. Air gap between relay armature and coil core is .012-.017 inch with contacts closed.

**LIGHTING:**—Briggs and Stratton Switch. Lighting switch is mounted at base of the steering column on the frame. Dimming is by resistance. Headlights are 6-8 volt, 32 cp. S.C. Mazda 1133. Side, tail, stop and backing lights are 6-8 volt, 6 cp. S.C. Mazda 81. Dash and corner lights are 6-8 volt, 6 cp. D.C. Mazda 82. Dome light is 6-8 volt, 3 cp. D.C. Mazda 64.

**FUSES:**—Fuses are mounted on the dash. They are 10 ampere capacity.

# MARQUETTE

## MODEL 30, 34, 35, 36, 36-S, 37 (1929)

### DELCO-REMY GENERATING, STARTING SYSTEM DELCO-REMY IGNITION

**BATTERY:**—Exide, Type 3-VXA-13-1, 6 volt. The negative (—) terminal is grounded. Starting capacity (20 minute rate) is 98 amperes for 20 minutes. Lighting capacity (5 ampere rate) is 5 amperes for 17 hours. Battery is mounted on the left frame member under the front floor boards.

**IGNITION:**—Coil Model 528-Q. Coil is mounted on the back of the instrument board with the ignition switch (which is built in the base of the coil) extending through to the face of the instrument panel. Ignition current is 2 amperes at 6 volts with the engine running and 5 amperes at 6 volts with engine stopped.

**Distributor Model 639-Y.** Breaker contacts separate .018-.025 inch. Set contact gap by loosening lock screw on crescent shaped stationary contact mounting plate and turning eccentric adjusting screw until correct gap is secured with breaker arm on lobe of cam. Resurface contacts when necessary with a fine flat contact file or on a medium hard oilstone. Breaker arm spring tension is 17-21 ounces. Distributor is semi-automatic. Maximum manual advance is — degrees (engine). Automatic advance begins at 400 R.P.M. (engine). Maximum automatic advance is 19-23 degrees reached at 2800 R.P.M. Condenser is mounted in a metal case on the side of the distributor shaft under the distributor head.

**Mounting:**—Distributor is mounted on the cylinder head. To remove distributor, disconnect primary lead and remove distributor head with cables intact. Then disconnect spark control wire and remove manual advance stop screw. Lift the distributor from place.

**Oiling:**—Fill the grease cup on the side of the distributor shaft with medium cup grease and turn down one turn every month or each 1000 miles. At the same time remove the distributor head and rotor and oil the wick oiler in the center of the shaft with light engine oil and put one drop of oil on the breaker arm pivot pin. Put a small bit of vaseline on the face of the breaker cam.

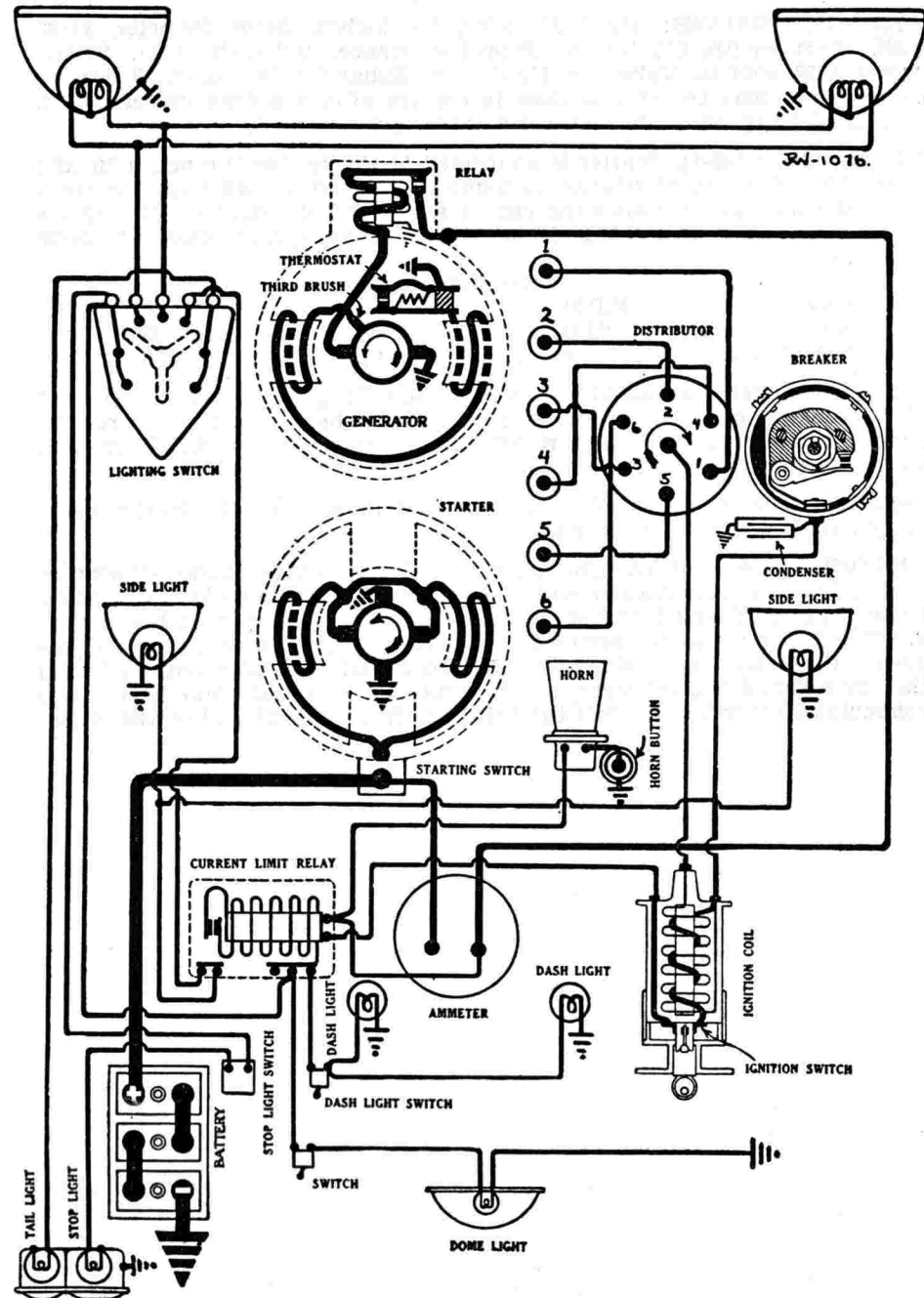
**Timing:**—Breaker contacts begin to open when the piston entering power stroke reaches a position 7 degrees on the flywheel before top dead center with the manual spark control in the fully advanced position. To set timing, crank engine over until piston No. 1 enters compression stroke (the up stroke with both valves closed). Fully advance manual spark control button (push button all the way in toward dash). Remove the cover over the inspection hole in the front of the flywheel case at the left of the engine directly under the starter and continue to crank engine until the flywheel mark 'ADV/7°' is directly opposite the line in the edge of the hole. Then loosen advance arm clamp screw and rotate distributor counter-clockwise until the contacts begin to open. Tighten the clamp screw and connect the segment opposite the rotor to the spark plug in cylinder No. 1.

**Firing Order:**—The firing order is 1-5-3-6-2-4.

**Spark Plugs:**—Spark plugs are 18MM. Metric, AC Type G-12. Gaps are .025 inch.

**VALVE TIMING:**—**INLET VALVES:**—Head diameter, 1½ inches. Stem diameter, ⅜ inch. Valve lift, .324 inch. Spring pressure, 40-46 pounds (valve closed—spring length, 2¼ inches), or 65-71 pounds (valve open—spring length, 1 15/16 inches). Tappet clearance, .006 inch (hot). Inlet valves open 5 degrees before top dead center and close 45 degrees after lower dead center.

**EXHAUST VALVES:**—Head diameter, 1⅜ inches. Stem diameter, ⅜ inch. Valve lift, .324 inch. Spring pressure, 40-46 pounds (valve closed—spring





# MARQUETTE

## MODEL 30, 34, 35, 36, 36-S, 37 (1929)

### DELCO-REMY GENERATING, STARTING SYSTEM DELCO-REMY IGNITION

length, 2 1/4 inches) or 65-71 pounds (valve open—spring length, 1 15/16 inches). Tappet clearance, .006 inch (hot). Exhaust valves open 45 degrees before lower dead center and close 18 degrees after top dead center.

**STARTER:**—Model 714-N. Starter is connected to the engine through a manual pinion shift interconnected with the starting switch. The direction of rotation is counter-clockwise, viewed from the commutator end. Brush spring tension is 24-28 ounces.

Starter Data			
Torque	R.P.M.	Volts	Amperes
0 lb. ft.....	5000.....	5.....	65
12 ".....	Lock.....	3.63.....	475

**Mounting:**—Starter is flange mounted at the left of the engine on the forward side of the flywheel housing. To remove starter, disconnect cable and starting pedal linkage and remove flange mounting cap screws. Then pull starter forward and lift from place.

**Oiling:**—Put 8 or 10 drops of light engine oil in the oiler on the commutator end of the starter every month or each 1000 miles. The drive end bearing is oilless.

**GENERATOR:**—Model 943-K. The direction of rotation is counter-clockwise, viewed from the commutator end. Generator current regulation is by third brush shunt field and thermostat. Thermostat contacts open at 165°F. cutting the resistance across the thermostat contacts in series with the shunt field and reducing the output approximately 40%. To adjust generator output, remove the commutator cover band and loosen the small round headed screw on the generator end plate. Then shift the third brush by hand in a counter-clockwise direction to increase the charging rate and in the opposite direction to decrease the charging rate. Tighten the screw after making the adjustment. With standard car setting, the maximum charging rate is 18-20 amperes (cold) reached at 1700 R.P.M. or 25 miles per hour.

Generator Data					
Cold Test			Hot Test		
Amperes	Volts	R.P.M.	Amperes	Volts	R.P.M.
18-20.....	8.2.....	1700	12.....	7.65.....	1750

Motoring, generator draws 5.5 amperes at 6 volts. Shunt field current is 4-6.1 amperes at 6 volts. Brush spring tension is 14-18 ounces.

**Mounting:**—Generator is mounted at left of engine on special hinge bracket and is driven by the fan belt. To remove generator, disconnect lead and loosen adjustment clamp bolt. Swing generator toward engine and slip off drive belt. Then remove two bolts extending through end plate flange to bracket and lift generator from place.

**Belt Adjustment:**—To adjust drive belt, loosen the adjustment clamp bolt and swing generator away from the engine until the proper belt tension is secured and tighten clamp bolt. Do not put too much tension on the belt or it will crowd the generator bearings.

**Oiling:**—Put 8 or 10 drops of light engine oil in the oiler at each end of the generator every month or each 1000 miles.

**RELAY:**—Model 265-G. Relay is mounted on the generator. Relay contacts close when the voltage of the generator reaches 7-7.5 volts and open with a discharge current of 0-2.5 amperes. Charging current at closing of contacts is approximately 2 amperes. Relay contacts open .015-.025 inch. Air gap is .014-.021 inch with contacts closed.

**LIGHTING:**—Delco-Remy Switch Model 486-B. Lighting switch is mounted at lower end of steering column. Headlights are double filament using the second 21 cp. filament instead of dimmers. Headlights are 6-8 volt, 21-21 cp. D.C. Mazda 1110. Side, dash and tail lights are each 6-8 volt, 3 cp. S.C. Mazda 63. Stop light is 6-8 volt, 15 cp. S.C. Mazda 87. Dome light is 6-8 volt, 6 cp. S.C. Mazda 81.

**CURRENT LIMIT RELAY:**—Model 410-A. This device is a vibrating circuit breaker connected in the lighting circuits to protect them from overload or short circuits. The circuit breaker begins to vibrate when the current reaches 25-30 amperes and continues limiting the current to 15 amperes. Contact gap is .012-.030 inch. Air gap is .019-.025 inch.

# OLDSMOBILE

## MODEL F-29 (1929) DELCO-REMY GENERATING, STARTING SYSTEM DELCO-REMY IGNITION

**BATTERY:**—Willard, Type UCB-13, 6 volt. The negative (—) terminal is grounded. Starting capacity (20 minute rate) is 98 amperes for 20 minutes. Lighting capacity (5 ampere rate) is 5 amperes for 16.8 hours. Battery is mounted under the driver's seat.

**IGNITION:**—Coil Model 528-Z. Coil is mounted on the back of the dash with the ignition switch in the base of the coil extending through to the face of the instrument board. Ignition current is 1.8 amperes at 6 volts with engine running and 4 amperes at 6 volts with engine stopped.

**Distributor Model 639-G.** Breaker contacts separate .022 inch. Set contact gap by loosening lock screw on crescent shaped stationary contact mounting plate and turning eccentric adjusting screw until correct gap is obtained with breaker arm on lobe of cam. Resurface contacts when necessary with a fine flat contact file or on a medium hard oilstone. Breaker arm spring tension is 17-21 ounces. Distributor is full automatic. Automatic advance begins at 400 R.P.M. (engine). Maximum automatic advance is 22 degrees reached at 2800 R.P.M.

**Mounting:**—Distributor is mounted on the cylinder head. To remove distributor, disconnect primary lead and remove distributor head with cables intact. Then loosen advance arm clamp screw and lift distributor from place.

**Oiling:**—Fill the grease cup on the side of the shaft and turn down one half turn every month or each 1000 miles. At the same time, remove the distributor head and rotor and saturate the wick oiler in the center of the shaft with light engine oil and put a small amount of vaseline on the face of the breaker cam.

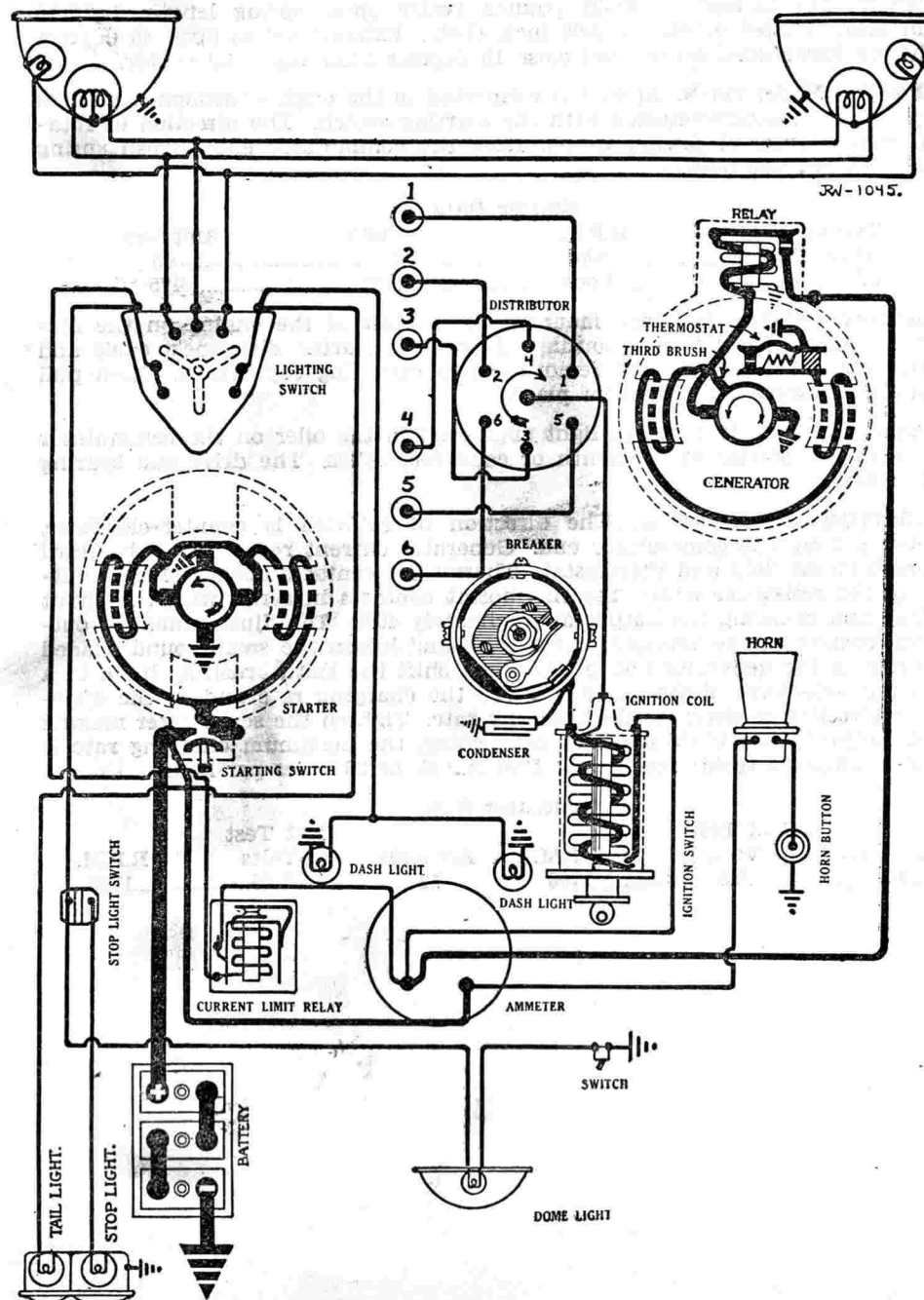
**Timing:**—Breaker contacts begin to separate when the piston entering power stroke reaches a position .020-.030 inch before top dead center with the breaker assembly in the fully retarded position. To set timing, crank engine over until piston No. 1 enters compression stroke (the up stroke with both valves closed). Continue to crank engine until piston reaches firing position when the flywheel mark '0' will be in line with the indicator in the peephole in the front of the flywheel housing on the left of the engine. Loosen advance arm clamp screw and rotate distributor until contacts begin to separate. Tighten the clamp screw and connect the segment opposite the rotor to the spark plug in cylinder No. 1. Connect the remaining spark plugs in order 5-3-6-2-4 clockwise around the distributor.

**Firing Order:**—The firing order is 1-5-3-6-2-4.

**Spark Plugs:**—Spark plugs are Metric A.C. Type G. Gaps are .025 inch.

**VALVE TIMING:**—**INLET VALVES:**—Head diameter, 1 17/32 inches. Stem diameter, 11/32 inch. Stem length, 5 3/8 inches (over all). Valve lift (with .010 inch lash), .320 inch. Spring pressure, 68 pounds compressed to 1 15/16 inches. Tappet clearance, .008 inch (hot) running and .010 inch when setting camshaft. Inlet valves open at top dead center (with .010 inch clearance) and close 50 degrees after lower dead center. The flywheel is marked '0' at the top dead center position.

**EXHAUST VALVES:**—Head diameter, 1 13/32 inches. Stem diameter, 3/8 inch. Stem length, 5 3/8 inches (over all). Valve lift, .320 inch. Spring pressure, 68 pounds compressed to 1 15/16 inches. Tappet clearance, .008 inch (hot). Exhaust valves open 40 degrees before lower dead center and close 10 degrees after top dead center. Valve stem guides are removable. Oversize valves are not made.



# OLDSMOBILE

MODEL F-29 (1929)

DELCO-REMY GENERATING, STARTING SYSTEM

DELCO-REMY IGNITION

**STARTER:—Model 714-H.** Starter is connected to the engine through a manual pinion shift interconnected with the starting switch. The direction of rotation is counter-clockwise, viewed from the commutator end. Starter cranks the engine at 125 R.P.M. drawing 130 amperes at 5.5 volts. Brush spring tension is 24-28 ounces.

Starter Data			
Torque	R.P.M.	Volts	Amperes
0 lb. ft.....	5000.....	5.....	65
12 ".....	Lock.....	3.63.....	475

**Mounting:—**Starter is flange mounted at left of engine on forward side of fly-wheel housing. To remove starter, disconnect cable and remove starter pedal link pin. Then remove flange mounting cap screws, pull starter forward and lift from place.

**Oiling:—**Put 8 or 10 drops of light engine oil in the oiler on the commutator end of the starter every month or each 1000 miles. The drive end bearing is oilless.

**GENERATOR:—Model 949-W.** The direction of rotation is counter-clockwise, viewed from the commutator end. Generator current regulation is by third brush shunt field and thermostat. Thermostat contacts open at 170°F. cutting the resistance across the thermostat contacts in series with the field and reducing the output approximately 40%. To adjust generator output, remove the commutator cover band and loosen the small round headed screw on the generator end plate. Then shift the third brush by hand in a counter-clockwise direction to increase the charging rate and in the opposite direction to decrease the charging rate. Tighten the screw after making the adjustment. With standard car setting, maximum charging rate is 19-21 amperes (cold) reached at 1450 R.P.M. or approximately 25 M.P.H.

Generator Data					
Cold Test		R.P.M.	Hot Test		R.P.M.
Amperes	Volts		Amperes	Volts	
19-21.....	8.35-8.5.....	1450	9-12.....	7.35-7.65.....	1800-2000

Motoring, generator draws 5.5 amperes at 6 volts. Shunt field current is 4-6.1 amperes at 6 volts. Brush spring tension is 14-18 ounces.

**Mounting:—**Generator is flange mounted at right of engine on rear of timing chain case. To remove generator, disconnect lead and remove inspection cover on front of chain case. Then remove flange mounting cap screws and slide generator to the rear. Tie up the timing chain to prevent it slipping off camshaft sprocket and throwing the engine out of time.

**Oiling:—**Put 8 or 10 drops of light engine oil in the oiler on the commutator end of the generator every month or each 1000 miles. The drive end bearing is oiled by splash from the chain case.

**RELAY:—Model 265-B.** Relay is mounted on the generator. Relay contacts close at 7-9 M.P.H. when the generator voltage reaches 7-7.5 volts and open with a discharge current of 1-2.5 amperes. Contacts separate .015-.025 inch. Air gap is .014 inch with contacts closed.

**LIGHTING:—Delco-Remy Switch Model 486-B.** Lighting switch is mounted at the lower end of the steering column. Double filament headlights are used instead of dimming. Headlights are 6-8 volt, 21-21 cp. D.C. Mazda 1110. Parking lights (in headlights) are 6-8 volt, 3 cp. S.C. Mazda 63. Stop light is 6-8 volt, 15 cp. S.C. Mazda 87. Dash, tail, side and dome lights are each 6-8 volt, 3 cp. S.C. Mazda 63.

**CURRENT LIMIT RELAY:—Model 410-C.** This device is a vibrating circuit breaker mounted on the dash and connected in the lighting circuits. It begins to vibrate when the current reaches 20-30 amperes and continues limiting the current to 2-15 amperes. Contact gap is .012-.030 inch. Air gap is .019-.025 inch.

**ACCESSORIES:—Horn is Klaxon Model 18-B.** Stop light switch is Delco-Remy Model 466-A.



# PACKARD

## MODELS 626-33 (1929) 640-45 (1929)

### OWEN DYNETO GENERATING, STARTING SYSTEM NORTH EAST IGNITION

**BATTERY:**—(626-33) Prest-O-Lite, Type A-615-SF, 6 volt. The positive (+) terminal is grounded. Starting capacity (20 minute rate) is 148.4 amperes for 20 minutes. Lighting capacity (5 ampere rate) is 5 amperes for 26.6 hours. (640-45) Prest-O-Lite, Type A-617-SF, 6 volt. The positive (+) terminal is grounded. Starting capacity (20 minute rate) is 169.6 amperes for 20 minutes. Lighting capacity (5 ampere rate) is 5 amperes for 32.2 hours. Battery is mounted on the right frame member.

**IGNITION:**—North East Coil. Coil is mounted on the back of the instrument board with the ignition switch (which is built in the base of the coil) extending through to the face of the instrument panel. Ignition current is 2.7 amperes at 6 volts with engine running and 6 amperes at 6 volts with engine stopped.

**Distributor Type 10858.** Breaker contacts separate .015-.020 inch. Set breaker gap by loosening lock nut on stationary contact mounting stud and turning up stud until correct gap is secured with breaker arm on lobe of cam. Resurface contacts when necessary with a fine flat contact file or on a medium hard oilstone. Breaker arm spring tension is 16-20 ounces. Distributor is full automatic with an auxiliary retard controlled by a button on the dash to provide retard in starting and to prevent the engine laboring under load. Breaker has two sets of contacts on an eight sided cam. Contacts open simultaneously and must be synchronized to secure correct performance. See Timing.

**Mounting:**—Distributor is mounted on the cylinder head. To remove distributor, disconnect primary lead and spark control and remove distributor head with cables intact. Then loosen advance clamp screw and lift distributor from place.

**Oiling:**—Fill the oiler on the side of the distributor with light engine oil and put several drops of oil in the wick oiler in the center of the shaft which is accessible after removing the distributor head and rotor, every 2000 miles.

**Timing:**—Synchronization of Contacts:—Check contacts with test lamps. If both sets of contacts do not open at the same instant, loosen lock screws on contact mounting plate and shift plate until contacts are synchronized. Check contact gap and reset at .015-.020 inch if necessary.

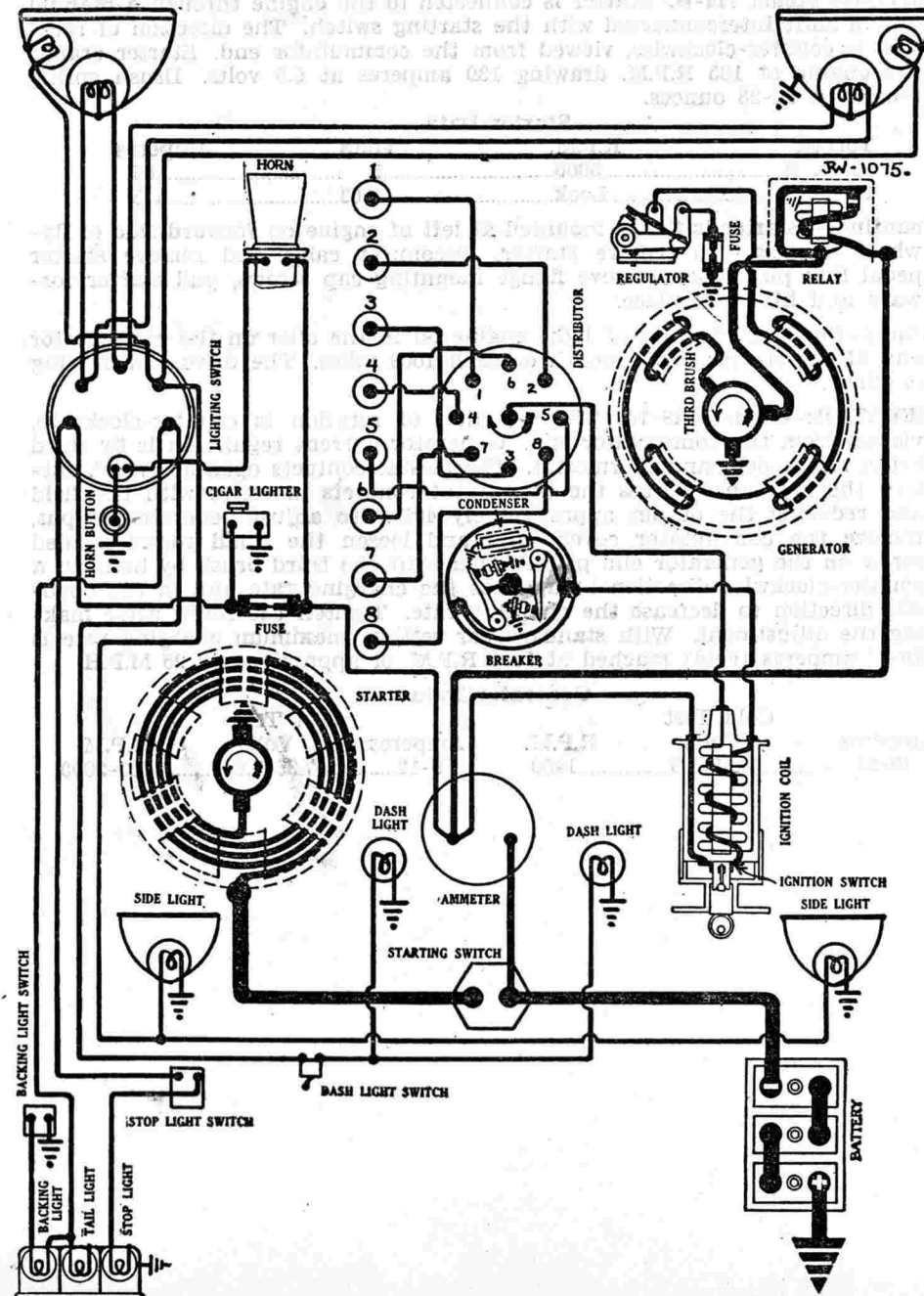
**Timing Distributor to Engine:**—Breaker contacts begin to separate when the piston entering power stroke reaches a position 29/32 inch (on the flywheel) before top dead center with the spark control button pushed all the way in, or in the fully advanced position. To set timing, crank engine over until piston No. 1 enters compression stroke (the up stroke with both valves closed). Make certain that the spark control button is in the advanced position. Continue to crank engine until a point on the flywheel 29/32 inch before the top dead center mark is opposite the indicator in the flywheel case. Then loosen advance arm clamp screw and rotate distributor until contacts begin to open. Tighten the clamp screw and connect the segment opposite the rotor to the spark plug in cylinder No. 1.

**Firing Order:**—The firing order is 1-6-2-5-8-3-7-4.

**Spark Plugs:**—Spark plugs are 7/8-18 S.A.E. Long. Gaps are .025 inch.

**VALVE TIMING:**—Specifications:—Head diameter of inlet valves is 1 21/32 inches (Model 626-33) and 1 13/16 inches (Model 640-45). Head diameter of exhaust valves is 1 15/32 inches (Model 626-33) and 1 11/16 inches (Model 640-45). Stem diameter is .3405 inch. Tappet clearance is .004 inch (hot).

**Timing:**—Inlet valves open and exhaust valves close at top dead center.



# PACKARD

## MODELS 626-33 (1929) 640-45 (1929) OWEN DYNETO GENERATING, STARTING SYSTEM NORTH EAST IGNITION

**STARTER:—Model DM-696.** Starter is connected to the engine through a Bendix drive. The direction of rotation is counter-clockwise, viewed from the commutator end. Brush spring tension is 26-28 ounces. The starter is a six pole motor with a single field coil which is so constructed that it winds around three sides of each pole piece. There are two brushes.

Starter Data			
Torque	R.P.M.	Volts	Amperes
0 lb. ft.	3000	6	50
35 "	Lock	3.5	650

It is important that the starter should not draw more than 50 amperes running light.

**Mounting:—**Starter is sleeve mounted at left of engine on forward side of fly-wheel housing. To remove starter, disconnect cable and remove large pilot mounting screw from flywheel case directly above starter sleeve. Then pull starter forward and lift from place.

**Oiling:—**Starter bearings are oilless. They require no attention.

**GENERATOR:—Model CD-840.** The direction of rotation is counter-clockwise, viewed from the commutator end. Generator is a four pole straight shunt machine with third brush control and 'Battery Charge Regulator'. To adjust generator output, remove the commutator cover and turn the slotted adjustment screw on the end plate. This shifts the third brush through a rack and pinion engagement. Turn the screw in a clockwise direction to increase the charging rate and in the opposite direction to decrease the charging rate. The 'Battery Charge Regulator' consists of an electrically operated thermostat which cuts a resistance in the field circuit and permits a relatively high charging rate without danger of overcharging the battery. The thermostat is compensated for temperature changes and is entirely automatic, requiring no service adjustment.

Generator Data		
Amperes	Volts	R.P.M.
0	6.4	600
16-18	8.0	1400
7	7.0	3500

Motoring, generator draws 7 amperes at 6 volts. Shunt field current is 4 amperes at 6 volts. Brush spring tension is 3 pounds. A five ampere field fuse is mounted on the end plate.

**Mounting:—**Generator is flange mounted at right of engine on rear of timing chain case. To remove generator, disconnect lead and remove three flange mounting cap screws. Then carefully pry generator to rear without disturbing plate between generator flange and chain case which carries generator bearing and drive sprocket. If this is removed the timing of the camshaft will be affected. The generator must not be run on the test stand unless a special test bearing is bolted on the drive end. This can be secured from the Owen Dyneto Corporation and is their part No. 22196. Do not crank the engine with the generator out.

**Oiling:—**Put 4 or 5 drops of light engine oil in the oiler on the commutator end of the generator every month or each 1000 miles. The drive end bearing is oiled from the chain case.

**BATTERY CHARGE REGULATOR:—Model 20100.** The regulator and cutout relay are mounted in a single case on the top of the generator. The relay contacts close at 600 R.P.M. when the generator voltage reaches 6.4 volts and open with a discharge current of 0-2 amperes. Relay contacts separate .015 inch. Air gap is .010 inch with contacts closed. The regulator consists of a fixed resistance wound on a spool and connected across the contacts of a special compensated thermostat. Thermostat is actuated by a fine resistance winding wound on the thermostat blade and connected across the generator. When the thermostat contacts open the resistance is cut in the field circuit.

**LIGHTING:—**Lighting switch is mounted at lower end of steering column. Headlights are 21 cp. double filament using the second 21 cp. filament instead of dimmers. Headlights are 6-8 volt, 21-21 cp. Mazda 1110. Auxiliary headlights are 6-8 volt, 3 cp. S.C. Mazda 63. Stop and backing lights are 6-8 volt, 21 cp. S.C. Mazda 1129. Dash, tail and side lights are each 6-8 volt, 3 cp. S.C. Mazda 63.

**FUSES:—**Generator field fuse is 5 ampere capacity. Lighting fuse mounted on block on dash is 20 ampere capacity.

## AUTO-LITE GENERATING, STARTING SYSTEM AUTO-LITE IGNITION

**BATTERY:—U.S.L. Type XY-15X-6, 6 volt.** The positive (+) terminal is grounded. Starting capacity (20 minute rate) is 119 amperes for 20 minutes. Lighting capacity (5 ampere rate) is 5 amperes for 20.8 hours. The battery is mounted on the right frame member.

**IGNITION:—Coil Model IG-4066.** Coil is mounted on the generator at the right of the engine. Ignition current is 1.5 amperes at 6 volts with engine running and 4.5 amperes at 6 volts with engine stopped.

**Distributor Model IGB-4016-A.** Breaker contacts separate .018-.020 inch. Set contact gap by loosening lock nut on stationary contact stud and turning up stud until correct gap is secured with breaker arm on lobe of cam. Resurface contacts when necessary with a fine flat contact file or on a medium hard oilstone. Breaker arm spring tension is 16-20 ounces. Distributor is semi-automatic. Maximum manual advance is 28 degrees (engine). Automatic advance begins at 400 R.P.M. (engine). Maximum automatic advance is 20 degrees reached at 2800 R.P.M. Ignition switch is a Type B Electrolock. Full details of the Electrolock are given in the Unit Section.

**Mounting:**—Distributor is mounted on the rear of the generator at the right of the engine and is driven by spiral gears from the generator shaft. To remove distributor, disconnect Electrolock at dash, disconnect spark control rod and remove distributor head with cables intact. Then remove hold-down screw in advance arm and lift distributor from place. The distributor and Electrolock assembly can then be removed from the car.

**Oiling:**—Put 8 or 10 drops of light engine oil in the oiler on the side of the distributor every two weeks or each 500 miles. Every 1000 miles put a small bit of vaseline on the face of the breaker cam.

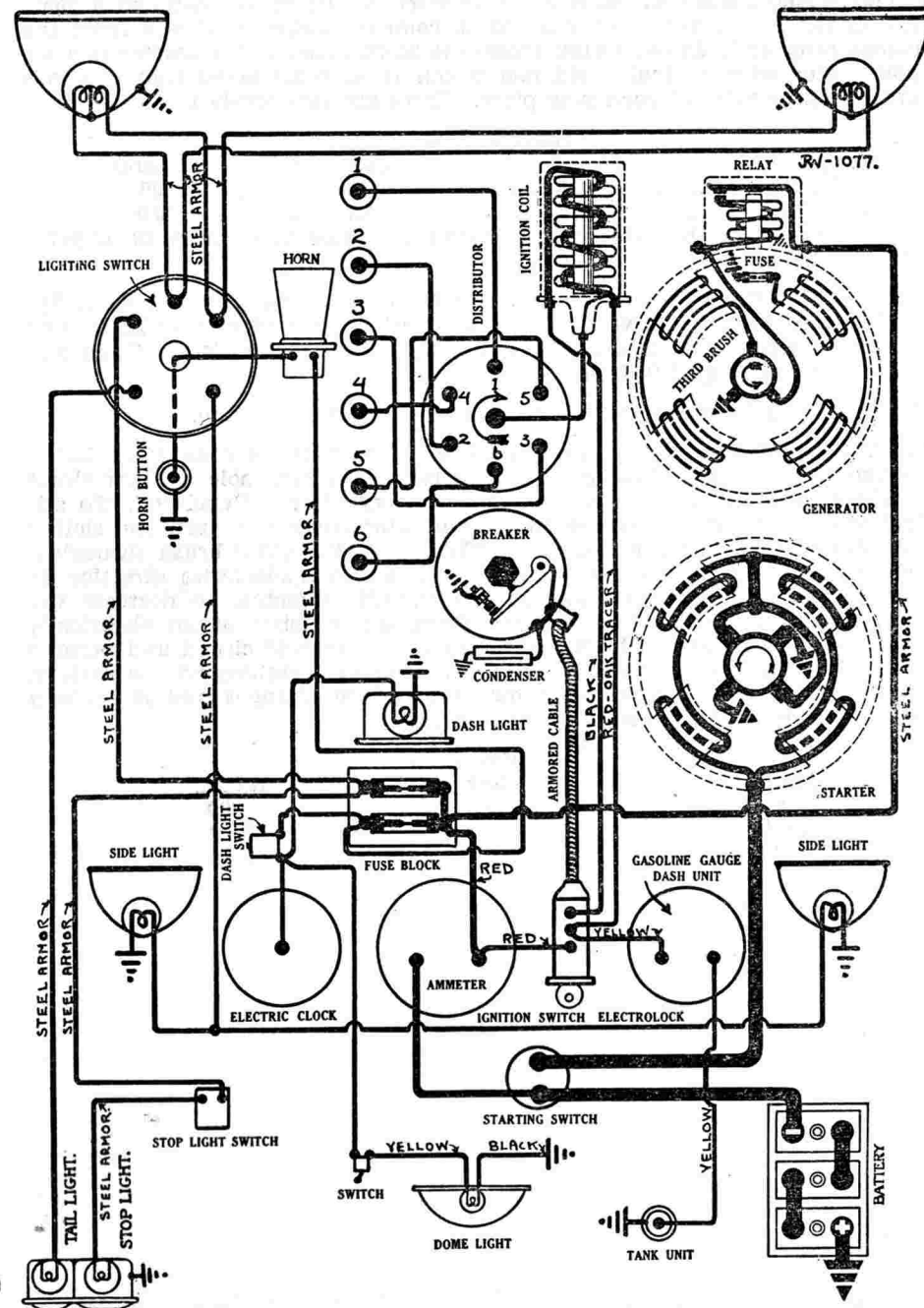
**Timing:**—Breaker contacts begin to separate when piston No. 1 on compression stroke reaches a position before top dead center when the flywheel mark 'IGN' is directly opposite the indicator in the inspection hole in the flywheel case with the spark control button in the fully advanced position. To set timing, crank engine over until piston No. 1 enters compression stroke (the up stroke with both valves closed). Fully advance spark control button (push button all the way in toward the dash). Continue to crank engine until the flywheel mark 'IGN' is directly under the indicator in the inspection hole in the flywheel case. Then loosen advance arm clamp screw and rotate distributor until contacts begin to separate. Tighten the clamp screw and connect the segment opposite the rotor to the spark plug in cylinder No. 1. Connect the remaining spark plugs in order 5-3-6-2-4 clockwise around the distributor head.

**Firing Order:—**The firing order is 1-5-3-6-2-4.

**Spark Plugs:**—Spark plugs are Champion 18MM. Metric. Gaps are .025 inch.

**VALVE TIMING:—Specifications:—**Head diameter, 1 $\frac{5}{8}$  inches. Stem diameter, .370 inch. Stem length, 5  $\frac{45}{64}$  inches. Valve lift, .3125 inch. Tappet clearance, .006 inch (hot). Spring pressure, 103-105 pounds (valve open). Valve stem guides are removable. Valves with oversize stems are not made.

**Valve Timing:**—Inlet valves open 5 degrees after top dead center and close 45 degrees after lower dead center. Exhaust valves open 40 degrees before lower dead center and close 5 degrees after top dead center. To set valve timing, crank engine over until piston No. 1 reaches top dead center when flywheel mark 'DC' will be directly in line with the flywheel pointer in the inspection hole in the right side of the flywheel housing. Set cam-





# PEERLESS

MODEL 6-81 (1929)

## AUTO-LITE GENERATING, STARTING SYSTEM AUTO-LITE IGNITION

shaft sprocket so that there are exactly eleven links in the chain between the timing mark in the camshaft sprocket and the timing mark in the crankshaft sprocket. To check timing, set tappet clearance of No. 1 exhaust valve (first valve at front of engine) at .010 inch. Crank engine over until No. 6 piston is coming up on compression stroke. Remove the timing plug in the cylinder head directly over No. 6 piston and insert a long wire to determine piston movement. Crank engine over until flywheel mark 'EC' is directly under timing pointer. The exhaust valve in cylinder No. 1 should just close at this point. After checking setting, set tappet clearance at .006 inch.

**STARTER:—Model MAD-4104.** Starter is connected to the engine through a Bendix drive. The direction of rotation is counter-clockwise, viewed from the commutator end. Brush spring tension is  $1\frac{3}{4}$ -2 $\frac{1}{2}$  pounds each.

Starter Data			
Torque	R.P.M.	Volts	Amperes
.3 lb. ft.	2750	5.5	100
2.8 "	1360	5.0	200
5.7 "	800	4.5	300
8.7 "	400	4.0	400
15.2 "	Lock	3.6	760

**Mounting:—**Starter is flange mounted at right of engine on forward side of flywheel housing. To remove starter, disconnect cable and remove three flange mounting cap screws. Then pull starter forward to free Bendix drive and lift from place.

**Oiling:—**Starter bearings are oilless. They require no attention.

**GENERATOR:—Model GAG-4114.** The direction of rotation is counter-clockwise, viewed from the commutator end. Generator current regulation is by third brush shunt field. To adjust the charging rate, remove the commutator cover band and shift the third brush by tapping on the mounting stud with a screwdriver. Shift the third brush in a counter-clockwise direction to increase the charging rate and in the opposite direction to decrease the charging rate. The third brush is held in position by friction between the mounting stud and the end plate. With standard car setting, maximum charging rate is 18 amperes at 8 volts reached at 1300 R.P.M. or — miles per hour.

### Generator Data

Amperes	Volts	R.P.M.
0	6.4	475
4	6.75	575
8	7.1	700
12	7.4	850
16	7.8	1050
18	8.0	1300

Motoring, generator draws 5.5 amperes at 6 volts. Shunt field current is 4.5 amperes at 6 volts. Brush spring tension is 22-28 ounces.

**Mounting:—**Generator is flange mounted at right of engine on rear of timing chain case. To remove generator, first disconnect all ignition wiring or remove distributor and coil. Then disconnect generator lead and take off inspection cover directly over generator sprocket. Remove cotter and take off nut on end of generator shaft. Then remove flange mounting cap screws and pull generator to the rear. Tie up timing chain to prevent slipping of chain and do not crank engine with generator out.

**Adjustment of Timing Chain:—**Timing chain is adjusted by shifting generator. To take up timing chain, loosen flange mounting screws and pry generator away from the engine with engine running until the chain begins to hum. Slack up the generator until chain runs noiselessly and tighten the mounting screws.

**Oiling:—**Put 3 or 4 drops of light engine oil in the oiler on the commutator end of the generator and 10 drops of oil in the distributor drive gear oiler every two weeks or each 500 miles.

**RELAY:—Model CB-4012.** Relay is mounted on the side of the generator. Relay contacts close at 550 R.P.M. when the generator voltage reaches 6.5-7 volts and open with a discharge current of  $\frac{1}{2}$ -2 $\frac{1}{2}$  amperes. Charging current at closing of contacts must not exceed 3 amperes. Contacts separate .030 inch. Air gap is .010-.030 inch with contacts closed.

**LIGHTING:—Soreng Manegold Switch.** Lighting switch is mounted at lower end of steering column. Double filament headlights are used with a second 21 cp. filament instead of dimmers. Headlights are 6-8 volt, 21-21 cp. D.C. Mazda 1110. Side (cowl) lights are 6-8 volt, 3 cp. S.C. Mazda 63. Stop light is 6-8 volt, 15 cp. S.C. Mazda 87. Dash, tail and dome lights are each 6-8 volt, 3 cp. S.C. Mazda 63.

**FUSES:—**Generator field fuse is 5 ampere capacity. Lighting fuses mounted on fuse block on dash are each 20 ampere capacity.

**MODEL 125 (1929)**  
**DELCO-REMY GENERATING, STARTING SYSTEM**  
**DELCO-REMY IGNITION**

**BATTERY:**—Exide, Type 3-XC-19-18, 6 volt. The positive (+) terminal is grounded. Starting capacity (20 minute rate) is 146 amperes for 20 minutes. Lighting capacity (5 ampere rate) is 5 amperes for 27 hours. Battery is mounted under the left front seat.

**IGNITION:—Coil Model 553-C.** This unit consists of two coils with a lock switch built in the base of the unit. Coils are mounted on the back of the instrument board with the ignition switch extending through to the face of the instrument panel.

**Distributor Model 668-D.** Breaker contacts separate .022 inch. Set contact gap by loosening lock screw on stationary contact mounting bracket and turning eccentric adjusting screw until correct gap is secured with breaker arm on lobe of cam. Resurface contacts with a fine flat contact file or on a medium hard oilstone. Breaker arm spring tension is 18-21 ounces. Distributor is semi-automatic. Maximum manual advance is 25 degrees (engine). Automatic advance begins at 600 R.P.M. of engine. Maximum automatic advance is 19 degrees reached at 3200 R.P.M. Breaker has two sets of contacts on a four sided cam. Each set of contacts controls one coil and fires the spark plugs in four cylinders. Contacts open alternately at intervals of 45 degrees which corresponds with the firing interval of 90 degrees on the engine crankshaft. Contacts must be synchronized for correct ignition performance. See Timing

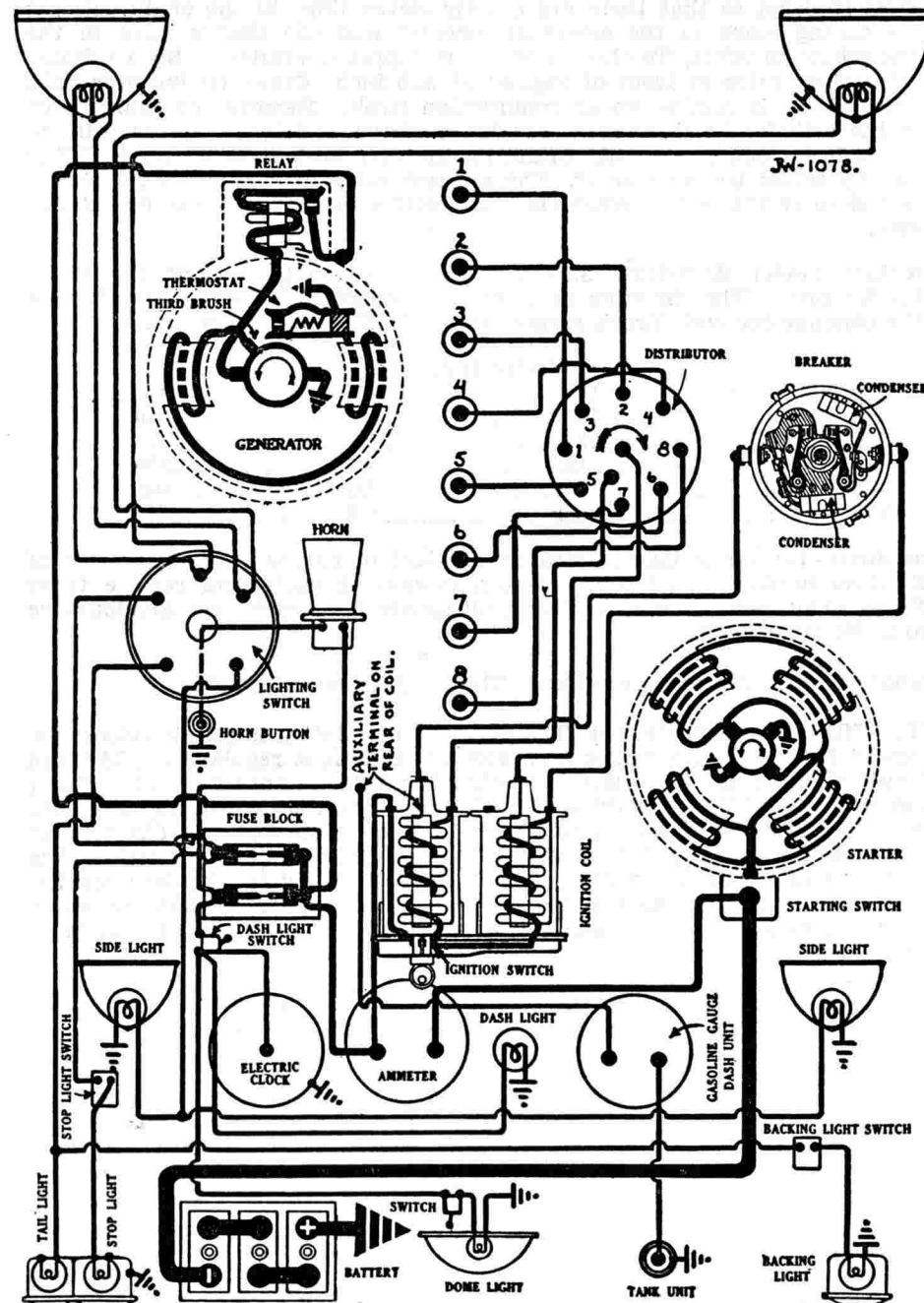
**Mounting:**—Distributor is mounted on the cylinder head. To remove distributor, disconnect manual spark control and primary leads and remove distributor head with cables intact. Then take out stop screw in advance arm and lift distributor from place.

**Oiling:**—Fill the grease cup on the side of the distributor housing with medium cup grease and turn down two turns every month or each 1000 miles. At the same time remove the distributor head and rotor and saturate the wick oiler in the center of the shaft with light oil and put a small bit of vaseline on the face of the breaker cam.

**Timing:—Synchronization of Contacts:—**To synchronize contacts use special Delco-Remy Tool and follow directions on Page S-31. Contacts can be synchronized without use of tool after distributor has been timed to engine by cranking engine over 90 degrees from firing position of piston No. 1 when piston No. 6 will reach top dead center entering power stroke. If the second set of contacts do not open at this point, loosen the two lock screws on the movable breaker plate and turn the eccentric adjusting screw until the contacts begin to open. Tighten the lock screws and check the contact with the breaker arm on the lobe of the cam. If outside limits of .018-.024 inch, reset at .022 inch and repeat synchronization.

**Timing Distributor to Engine:**—Breaker contacts begin to separate when the piston entering power stroke reaches top dead center with the manual spark control fully retarded. To set timing, crank engine over until piston No. 1 enters compression stroke. This is the up stroke with both valves closed. Retard the spark lever. Continue to crank the engine until piston reaches top dead center. Then loosen advance arm clamp screw and rotate the distributor until the contacts begin to open. Tighten the clamp screw and connect the segment directly opposite the rotor to the spark plug in cylinder No. 1. Connect the remaining spark plugs in order 3-2-4-8-6-7-5 clockwise around the distributor head.

**Firing Order:—**The firing order is 1-6-2-5-8-3-7-4.



# PEERLESS

MODEL 125 (1929)

DELCO-REMY GENERATING, STARTING SYSTEM

DELCO-REMY IGNITION

**Spark Plugs:**—Spark plugs are 18MM. Metric. Gaps are .025 inch.

**VALVE TIMING:**—**INLET VALVES:**—Head diameter, 1½ inches. Stem diameter, ¾ inch. Stem length, 5½ inches. Valve lift, .370 inch. Tappet clearance, .006 inch. Inlet valves open 5 degrees after top dead center and close 50 degrees after lower dead center.

**EXHAUST VALVES:**—Head diameter, 1¾ inches. Stem diameter, ¾ inch. Stem length, 5½ inches. Valve lift, .370 inch. Tappet clearance, .008 inch. Exhaust valves open 40 degrees before lower dead center and close 5 degrees after top dead center. Valve stem guides are removable. Valves with oversize stems are not made.

**STARTER:**—Model 725-G. Starter is connected to the engine through a mechanical pinion shift interconnected with the starting switch. The direction of rotation is counter-clockwise, viewed from the commutator end. Brush spring tension is 24-28 ounces.

## Starter Data

Torque	R.P.M.	Volts	Amperes
0 lb. ft. ....	6000 .....	5 .....	65 .....
16 " .....	Lock .....	3 .....	600 .....

**Mounting:**—Starter is flange mounted at right of engine on forward side of flywheel housing. To remove starter, disconnect starter pedal linkage and starter cable. Then take out flange mounting cap screws and pull starter forward to clear drive. Lift from place.

**Oiling:**—Put 4 or 5 drops of light machine oil in the oiler on the commutator end of the starter every month or each 1000 miles. The drive end bearing is oilless.

**GENERATOR:**—Model 945-U. The direction of rotation is counter-clockwise, viewed from the commutator end. Generator current regulation is by third brush shunt field and thermostat. Thermostat contacts open at 165°F. cutting the resistance across the thermostat contacts in series with the shunt field and reducing the output approximately 40%. To adjust generator output, loosen the small round headed screw on the commutator end plate and remove the commutator cover band. Then shift the third brush by hand in

a counter-clockwise direction to increase the charging rate and in the opposite direction to decrease the charging rate. Tighten the screw after making the adjustment. With standard car setting, the maximum charging rate is 20 amperes (cold) reached at 1300 R.P.M. or 24 miles per hour.

## Generator Data

Cold Test		Hot Test	
Amperes	Volts	Amperes	Volts
18-20 .....	8.3 .....	9-12 .....	7.35-7.65 .....
	1300 .....		1300-1500 .....

Motoring, generator draws 5.5 amperes at 6 volts. Shunt field current is 4-6.1 amperes at 6 volts. Brush spring tension is 14-18 ounces.

**Mounting:**—Generator is flange mounted at left of engine on rear of timing chain case. The water pump is driven by an extension of the generator shaft. To remove generator, disconnect lead and water pump drive coupling and take out flange mounting cap screws. Then pull generator to the rear and lift from place.

**Oiling:**—Put 8 or 10 drops of light engine oil in the oiler at each end of the generator every month or each 1000 miles.

**RELAY:**—Model 265-B. Relay is mounted on the generator. Relay contacts close when the generator voltage reaches 7-7.5 volts and open with a discharge current of 0-2.5 amperes. Charging current at closing of contacts is approximately 2 amperes. Contacts separate .015-.025 inch. Air gap is .014-.020 inch with contacts closed.

**LIGHTING:**—**Soreng Manegold Switch.** Lighting switch is mounted at lower end of steering column. Headlights are double filament using a second 21 cp. filament instead of dimmers. Headlights are 6-8 volt, 21-21 cp. D.C. Mazda 1110. Side lights are 6-8 volt, 3 cp. S.C. Mazda 63. Auxiliary headlights are 6-8 volt, 3 cp. S.C. Mazda 63. Backing light is 6-8 volt, 21 cp. S.C. Mazda 1129. Stop light is 6-8 volt, 15 cp. S.C. Mazda 87. Instrument lights, inspection lights, dome, reading lights and tail lights are each 6-8 volt, 3 cp. S.C. Mazda 63.

**FUSES:**—Lighting fuses mounted in fuse box are 20 ampere capacity.



**MODEL 125 (123 INCH WHEELBASE) 126 (143 INCH WHEELBASE)  
DELCO-REMY GENERATING, STARTING SYSTEM  
DELCO-REMY IGNITION**

**IGNITION:—Coil Model 528-E (2 used).** Ignition coils are mounted on the dash. Ignition current is 3.6 amperes at 6 volts with engine running and 8 amperes at 6 volts with engine stopped.

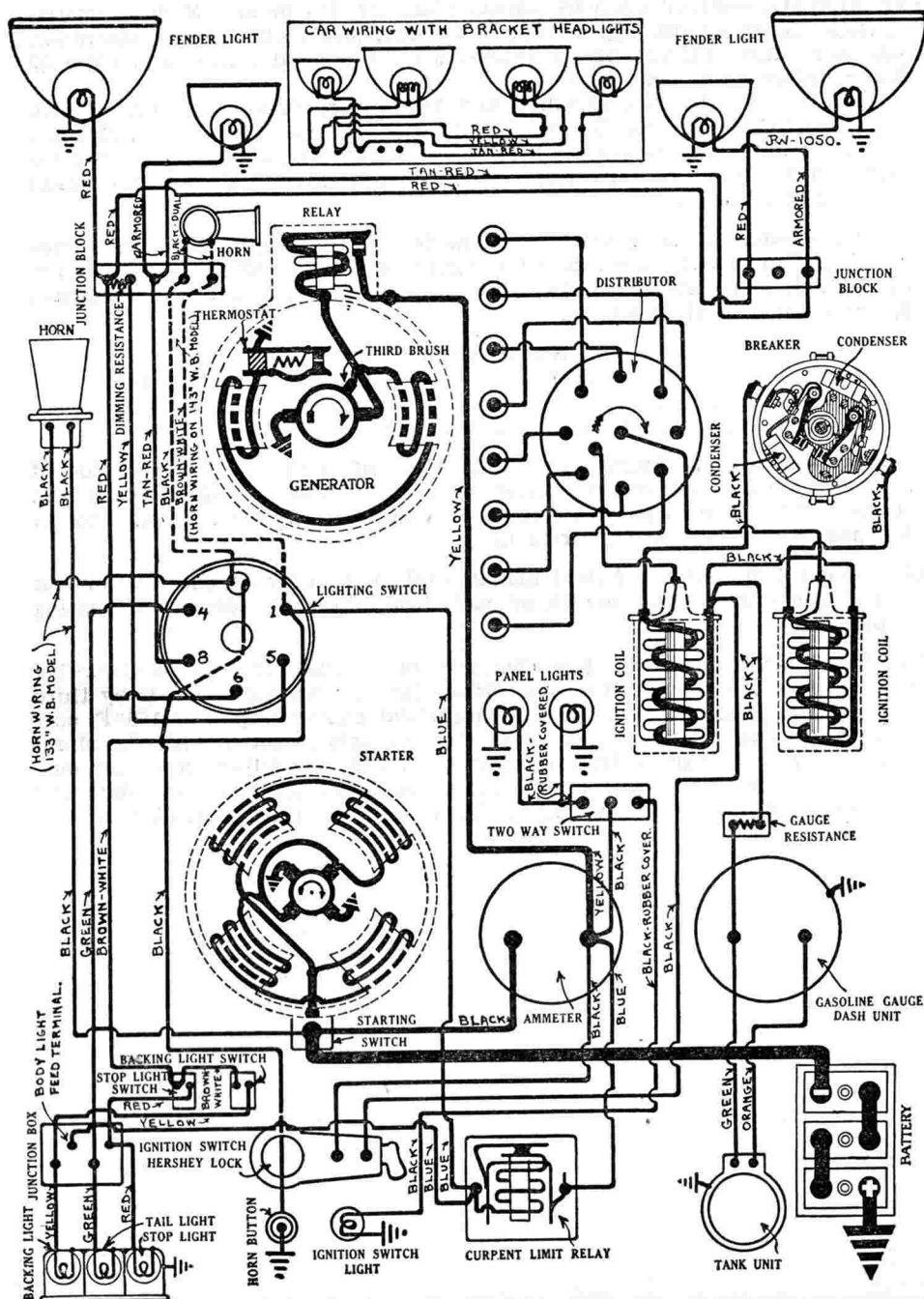
**Distributor Model 668-E.** Breaker contacts separate .018 inch. Set contact gap by loosening lock screw on stationary contact mounting plate and turning eccentric adjusting screw until correct gap is secured with breaker arm on lobe of cam. Resurface contacts when necessary with a fine flat contact file or on a medium hard oilstone. Breaker arm spring tension is 18-21 ounces. Distributor is semi-automatic. Maximum manual advance is 35 degrees (engine). Automatic advance begins at 600 R.P.M. (engine). Maximum automatic advance is 19.5 degrees reached at 3200 R.P.M. Breaker has two sets of contacts operating on a single four sided cam. Each set of contacts controls one coil and fires the spark plugs in four cylinders. Contacts separate alternately at intervals of 45 degrees corresponding to 90 degrees of crankshaft rotation which is the correct firing interval for the Pierce Arrow engine. Contacts must be synchronized for correct performance. See Timing.

**Mounting:**—Distributor is mounted on the cylinder head and may be removed from the left side. To remove distributor, disconnect primary leads and spark control and take off distributor head with cables intact. Then remove nuts from three base mounting studs and lift distributor from place.

**Oiling:**—Fill the grease cup on the side of the distributor shaft with medium cup grease and turn down two turns every 2500 miles. At the same time remove the distributor head and rotor and saturate the wick oiler in the center of the shaft with light engine oil. Put a small bit of vaseline on the face of the breaker cam.

**Timing:—Synchronization of Contacts:—**To synchronize contacts, use special Delco-Remy Tool and follow directions on Page S-31. Contacts can be synchronized without tool after distributor has been timed to engine by cranking engine over 90 degrees from firing position of piston No. 4 when piston No. 1 will reach firing position with ignition mark on flywheel opposite the indicator at the right of the flywheel housing. If the second set of contacts do not separate at this point, loosen the two lock screws and turn the eccentric adjusting screw until contacts open. Tighten the lock screws and check the contact gap with breaker arm on lobe of the cam. If outside limits of .018-.024 inch reset at .022 inch and repeat synchronization.

**Timing Distributor to Engine:**—Breaker contacts begin to separate when the piston entering power stroke reaches a position one inch before top dead center on the flywheel with the spark control in the fully advanced position. To set timing, crank engine over until piston No. 4 enters compression stroke (the up stroke with both valves closed). Fully advance spark lever. Continue to crank engine until the ignition mark for piston No. 4 on the flywheel is opposite the indicator on the right side of the flywheel housing. Loosen advance arm clamp bolt and rotate distributor counter-clockwise until the set of contacts on the right side of the distributor begin to open. Tighten the clamp screw. Then crank engine over 90 degrees until ignition mark for piston No. 1 is opposite the indicator and check synchronization by making sure that the second set of contacts open at this point.



# PIERCE ARROW

STRAIGHT EIGHT (1929)

MODEL 125 (123 INCH WHEELBASE) 126 (143 INCH WHEELBASE)

DELCO-REMY GENERATING, STARTING SYSTEM

DELCO-REMY IGNITION

**Firing Order:**—The firing order is 1-6-2-5-8-3-7-4. Distributor is of the side outlet type and connections should be made 3-2-4-1-5-8-7-6 from front to rear of the distributor.

**Spark Plugs:**—Spark plugs are  $\frac{7}{8}$ -18 S.A.E. Standard. Gaps are .025 inch.

**VALVE TIMING:**—**INLET VALVES:**—Head diameter, 1 21/32 inches. Stem diameter, .3725 inch. Valve lift, .359 inch. Tappet clearance, .002-.003 inch (hot). Inlet valves open 5 degrees after top dead center and close 45 degrees after lower dead center.

**EXHAUST VALVES:**—Head diameter, 1 9/32 inches. Stem diameter, .3715 inch. Valve lift, .359 inch. Tappet clearance, .003-.004 inch (hot). Exhaust valves open 40 degrees before lower dead center and close 12 degrees after top dead center. Valve stem guides are removable.

**STARTER:**—Model 728-C. Starter is connected to the engine through a manual pinion shift interconnected with the starting switch pedal. The direction of rotation is clockwise (armature shaft) viewed from the commutator end. Starter brush spring tension is 20-28 ounces.

Starter Data			
Torque	R.P.M.	Volts	Amperes
0 lb. ft.	2500	5	70
1 "	1500	5.5	100
4.8 "	725	5.4	200
9.3 "	425	4.5	300
15.8 "	250	4.1	400
20.4 "	200	3.6	500
28 "	Lock	3.0	600

**Mounting:**—Starter is flange mounted at left of engine on forward side of flywheel housing. To remove starter, disconnect cable, pedal rod and pedal return spring and remove three flange mounting cap screws. Then pull starter forward and lift from place.

**Oiling:**—Put 8 or 10 drops of light engine oil in each of the starter bearing oilers every 2500 miles. Once each year remove the grease plug in the reduction gear case and repack the gear case with medium grease.

**GENERATOR:**—Model 955-C. The direction of rotation is clockwise viewed from the commutator end. Generator current regulation is by third brush shunt field and thermostat. Thermostat contacts open at 165°F. cutting the resistance across the thermostat contacts in series with the shunt field and reducing the output approximately 40%. To adjust generator output, remove the commutator cover band and loosen the small round headed screw on the generator end plate. Then shift the third brush in a clockwise direction to increase the charging rate and in the opposite direction to decrease the charging rate. Tighten the screw after making the adjustment. With stan-

dard car setting the maximum charging rate is 10-12 amperes (hot) reached at 2100 R.P.M. or 25 miles per hour.

Generator Data					
Cold Test			Hot Test		
Amperes	Volts	R.P.M.	Amperes	Volts	R.P.M.
2	6.4	650	2	6.4	825
7	6.8	825	8	6.9	1250
15	7.8	1200	12	7.5	2000
19-21	8.35-8.5	1650	10	7.2	2800
15.5		2400			

Motoring, generator draws 5.5 amperes at 6 volts. Shunt field current is 4-6.1 amperes at 6 volts. Brush spring tension is 14-18 ounces.

**Mounting:**—Generator is flange mounted at left of engine on rear of timing chain case. The water pump is mounted on the rear of the generator and is driven by an extension of the generator shaft. To remove generator, drain radiator, disconnect water pump couplings and remove water pump by taking two cap screws. Then disconnect generator lead, remove three flange mounting cap screws, pull generator to rear to disconnect shaft, and lift from place.

**Oiling:**—Put 4 or 5 drops of light engine oil in each of the generator bearing oilers every 500 miles.

**RELAY:**—Model 265-B. Relay is mounted on the generator. Relay contacts close at 650 R.P.M. when the generator voltage reaches 7-7.5 volts and open with a discharge current of 0-2.5 amperes. Charging current at closing of contacts is approximately 2 amperes. Relay contacts separate .015-.025 inch. Air gap is .014-.021 inch with contacts closed.

**LIGHTING:**—Delco-Remy Switch Model 486-D. Lighting switch is mounted at lower end of steering column. Headlights mounted on fenders are 21 cp. single filament with a dimming resistance mounted on the junction block at the front of the car. Headlights mounted on brackets are 21 cp. double filament without the resistance. Headlights are 6-8 volt, 21 cp. S.C. Mazda 1129 or 6-8 volt, 21-21 cp. D.C. Mazda 1110. Auxiliary lights are 6-8 volt, 6 cp. S.C. Mazda 81. Stop and backing lights are each 6-8 volt, 21 cp. S.C. Mazda 1129. Step and tail lights are each 6-8 volt, 6 cp. S.C. Mazda 81. Dash, dome and corner lights are each 6-8 volt, 3 cp. S.C. Mazda 63. A 15 cp. Mazda 87 dome light may be used.

**CURRENT LIMIT RELAY:**—Model 410-C. This device is a vibrating circuit breaker mounted on the dash and wired in the lighting circuits. It begins to vibrate when the current reaches 20-30 amperes and continues to operate limiting the current to 2-15 amperes. Circuit breaker contact gap is .012-.030 inch. Air gap is .019-.025 inch with contacts closed.

# PONTIAC

## 'BIG SIX' MODEL 6-29 (1929)

### DELCO-REMY GENERATING, STARTING SYSTEM DELCO-REMY IGNITION

**BATTERY:**—Willard, Type RSB-13, 6 volt. The negative (—) terminal is grounded. Starting capacity (20 minute rate) is 98 amperes for 20 minutes. Lighting capacity (5 ampere rate) is 5 amperes for 17 hours. Battery is mounted on the left frame member under the front floor boards.

**IGNITION:**—Coil Model 528-C. Coil is mounted on the dash. Ignition current is 1.5-3 amperes at 6 volts with engine running and 4.5 amperes at 6 volts with engine stopped.

**Distributor Model 639-U.** Breaker contacts separate .018-.024 inch. Set contact gap by loosening lock screw on crescent shaped stationary contact mounting plate and turning eccentric adjusting screw until correct gap is secured with breaker arm on lobe of cam. Resurface contacts when necessary with a fine flat contact file or on a medium hard oilstone. Breaker arm spring tension is 17-21 ounces. Distributor is full automatic. Automatic advance begins at 600 R.P.M. (engine). Maximum automatic advance is 24.5 degrees (engine) reached at 2600 R.P.M. Ignition switch is Delco-Remy Dual-Lock Model 425-L.

**Mounting:**—Distributor is mounted on the cylinder head. To remove distributor, disconnect primary lead and remove distributor head with cables intact. Then loosen advance arm clamp screw and lift distributor from place.

**Oiling:**—Fill the grease cup on the side of the distributor shaft with medium cup grease and turn down one half turn every month or each 1000 miles. At the same time remove the distributor head and rotor and oil the wick oiler in the center of the shaft with light engine oil and put one drop of oil on the breaker arm pivot pin. Put a small bit of vaseline on the face of the breaker cam.

**Timing:**—Breaker contacts begin to separate when the piston entering power stroke reaches a position 4 degrees on the flywheel before top dead center. To set timing, crank engine over until piston No. 1 enters compression stroke (the up stroke with both valves closed). Carefully crank engine until piston reaches firing position. Then loosen the advance arm clamp screw and rotate the distributor until breaker contacts begin to open. Tighten the clamp screw and connect the segment opposite the rotor to the spark plug in cylinder No. 1. Connect the remaining spark plugs in order 5-3-6-2-4 counter-clockwise around the distributor head.

**Firing Order:**—The firing order is 1-5-3-6-2-4.

**Spark Plugs:**—Spark plugs are 7/8-18 S.A.E. Standard. Gaps are .025 inch.

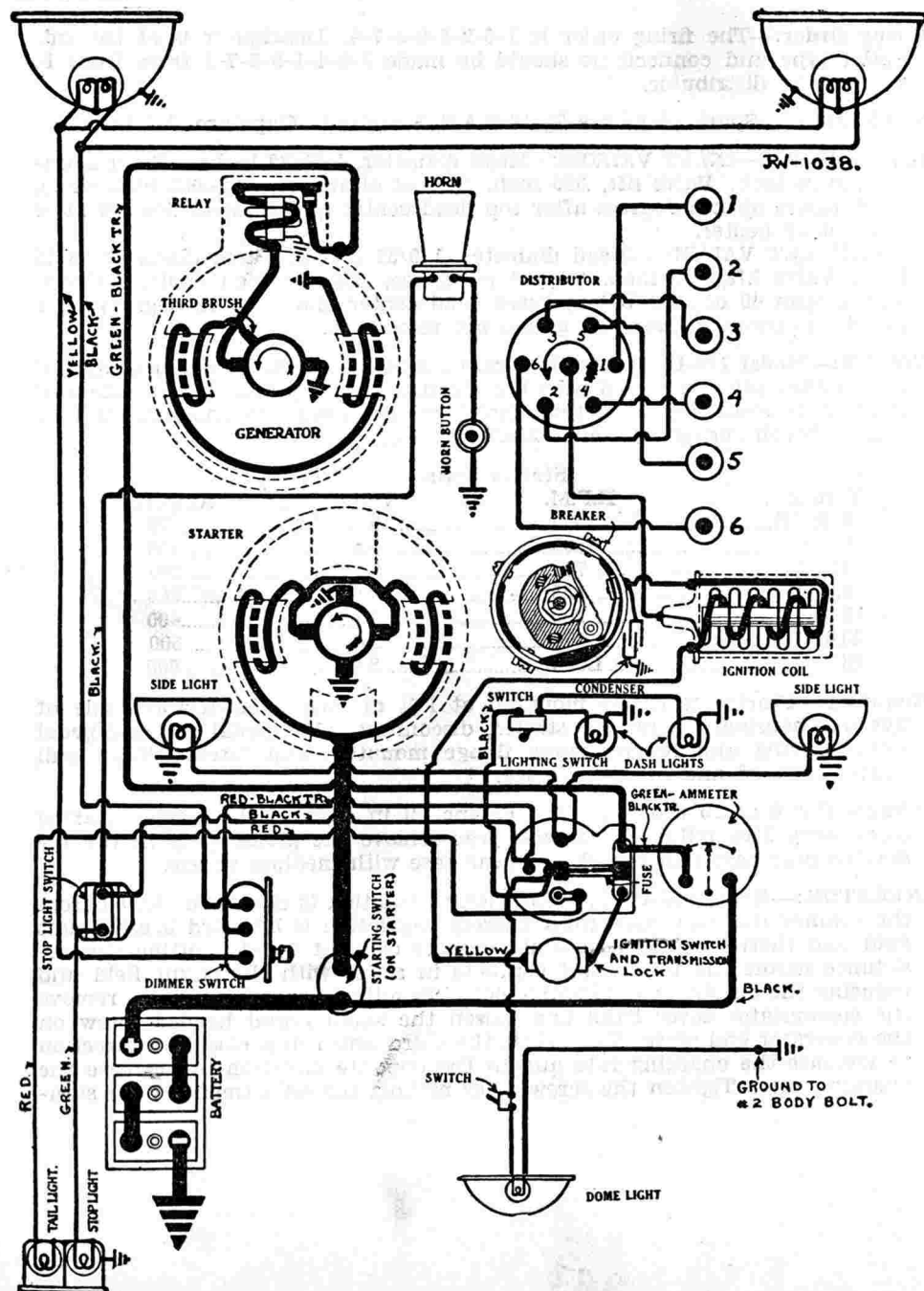
**VALVE TIMING:**—INLET VALVES:—Head diameter, 1 13/32 inches. Valve lift, 5/16 inch. Tappet clearance, .007-.009 inch. Inlet valves open 7 degrees after top dead center and close 39 degrees after lower dead center.

**EXHAUST VALVES:**—Head diameter, 1 13/32 inches. Valve lift, 5/16 inch. Tappet clearance, .007-.009 inch. Exhaust valves open 42 degrees before lower dead center and close 7 degrees after top dead center.

**STARTER:**—Model 714-F. Starter is connected to the engine through a Bendix drive. The direction of rotation is counter-clockwise, viewed from the commutator end. Brush spring tension is 24-28 ounces.

#### Starter Data

Torque	R.P.M.	Volts	Amperes
0 lb. ft.	5000	5	65
12 "	Lock	3.63	475





# PONTIAC

## 'BIG SIX' MODEL 6-29 (1929)

### DELCO-REMY GENERATING, STARTING SYSTEM DELCO-REMY IGNITION

**Mounting:**—Starter is flange mounted at left of engine on forward side of flywheel housing. To remove starter, disconnect cable and remove flange mounting cap screws. Then pull starter forward and lift from place.

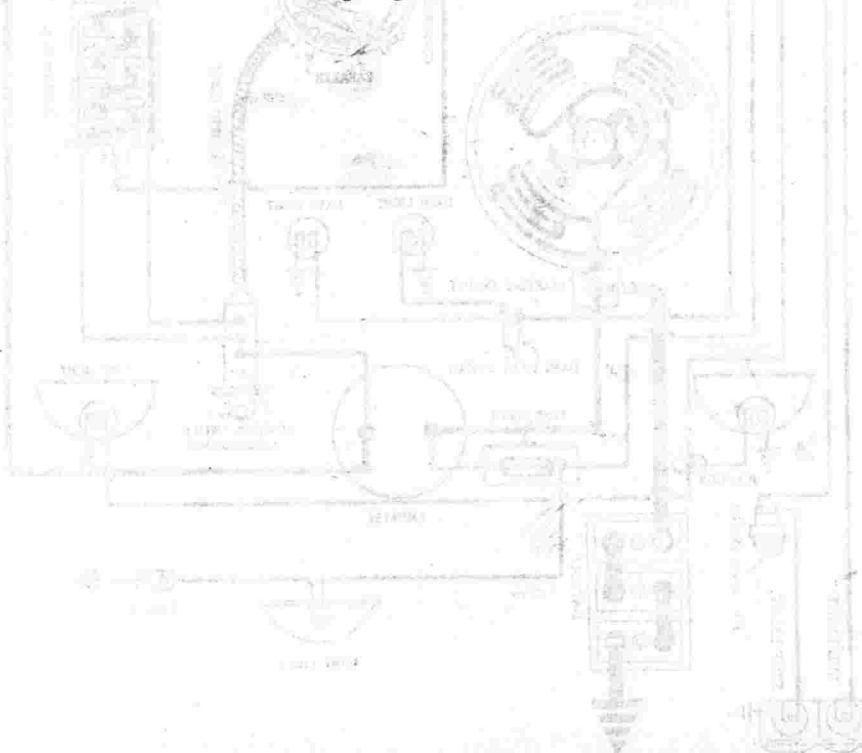
**Oiling:**—Put 8 or 10 drops of light engine oil in the oiler on the commutator end of the starter every month or each 1000 miles. The drive end bearing is oilless.

**GENERATOR:**—Model 943-J. The direction of rotation is counter-clockwise, viewed from the commutator end. Generator current regulation is by third brush shunt field. To adjust generator output, remove the commutator cover band and loosen the small round headed screw on the generator end plate. Then shift the third brush by hand in a counter-clockwise direction to increase the charging rate and in the opposite direction to decrease the charging rate. Tighten the screw after making the adjustment. With standard car setting, the maximum charging rate is 17 amperes (cold) reached at 1700 R.P.M. or 25 miles per hour.

**Generator Data**

Cold Test			Hot Test		
Amperes	Volts	R.P.M.	Amperes	Volts	R.P.M.
16-18.....	8.2.....	1700	11-13.....	7.55-7.85.....	1750-1850

Motoring, generator draws 5.5 amperes at 6 volts. Shunt field current is 4-5.9 amperes at 6 volts. Brush spring tension is 14-18 ounces.



**Mounting:**—Generator is mounted at left of engine by special swinging bracket. To remove generator, disconnect lead and loosen adjustment clamp arm bolt. Swing generator toward engine and slip off drive belt. Then take out two bolts holding generator on bracket and lift from place.

**Belt Adjustment.** To tighten fan belt, loosen adjustment clamp arm bolt and swing generator out from engine until proper belt tension is secured. Then tighten bolt. Be careful not to get the belt too tight or it will cause excessive wear of generator bearings.

**Oiling:**—Put 8 or 10 drops of light engine oil in the oiler at each end of the generator every month or each 1000 miles.

**RELAY:**—Model 265-B. Relay is mounted on the generator. Relay contacts close when the generator voltage reaches 6.75-7.5 volts and open with a discharge current of 0-2.5 amperes. Contacts separate .015-.025 inch. Air gap is .014-.021 inch with contacts closed.

**LIGHTING:**—Clum Switch Model 10741. Delco-Remy Dimmer Switch Model 465-B. Lighting switch is mounted on the instrument panel. Double filament headlights are used. They are controlled by the dimmer switch mounted on the toeboard. Headlights are 6-8 volt, 21-21 cp. D.C. Mazda 1110. Stop light is 6-8 volt, 15 cp. S.C. Mazda 87. Side, dash, tail and dome lights are each 6-8 volt, 3 cp. S.C. Mazda 63.

**FUSES:**—Lighting fuse mounted on the switch is 20 ampere capacity.

# REO

## FLYING CLOUD MATE MODEL B2 (1929)

### DELCO-REMY GENERATING, STARTING SYSTEM DELCO-REMY IGNITION

**BATTERY:**—Willard, Type RSB-13, 6 volt, 90 ampere hour. The negative (—) terminal is grounded. Starting capacity (20 minute rate) is 98 amperes for 20 minutes. Lighting capacity (5 ampere rate) is 5 amperes for 17 hours. Battery is mounted on the left frame member.

**IGNITION:**—Coil Model 528-C. Coil is mounted on the dash. Ignition current is 1-3 amperes at 6 volts with engine running and 3.4-5 amperes at 6 volts with engine stopped.

**Distributor Model 641-D.** Breaker contacts separate .020 inch. Set contact gap by loosening lock screw on stationary contact mounting plate directly behind breaker arm and turning eccentric adjusting screw until correct gap is obtained with breaker arm on lobe of cam. Resurface contacts when necessary with a fine flat contact file or on a medium hard oilstone. Breaker arm spring tension is 17-21 ounces. Distributor is semi-automatic. Maximum manual advance is 20 degrees (engine). Automatic advance begins at 900 R.P.M. of engine. Maximum automatic advance is 20 degrees reached at 3000 R.P.M. The ignition switch is a Type 5-B Electrolock.

**Mounting:**—The Electrolock must be disconnected at the dash and removed as a unit with the distributor whenever the distributor is taken off the engine. To remove distributor, disconnect manual advance rod and primary lead and remove distributor head with cables intact. Then take out the stop screw in the manual advance arm and lift the distributor from place. This will not disturb the timing and it will only be necessary in reassembling to make certain the tongue on the distributor shaft enters the groove in the drive shaft. The tongue is offset so that it can not be assembled incorrectly.

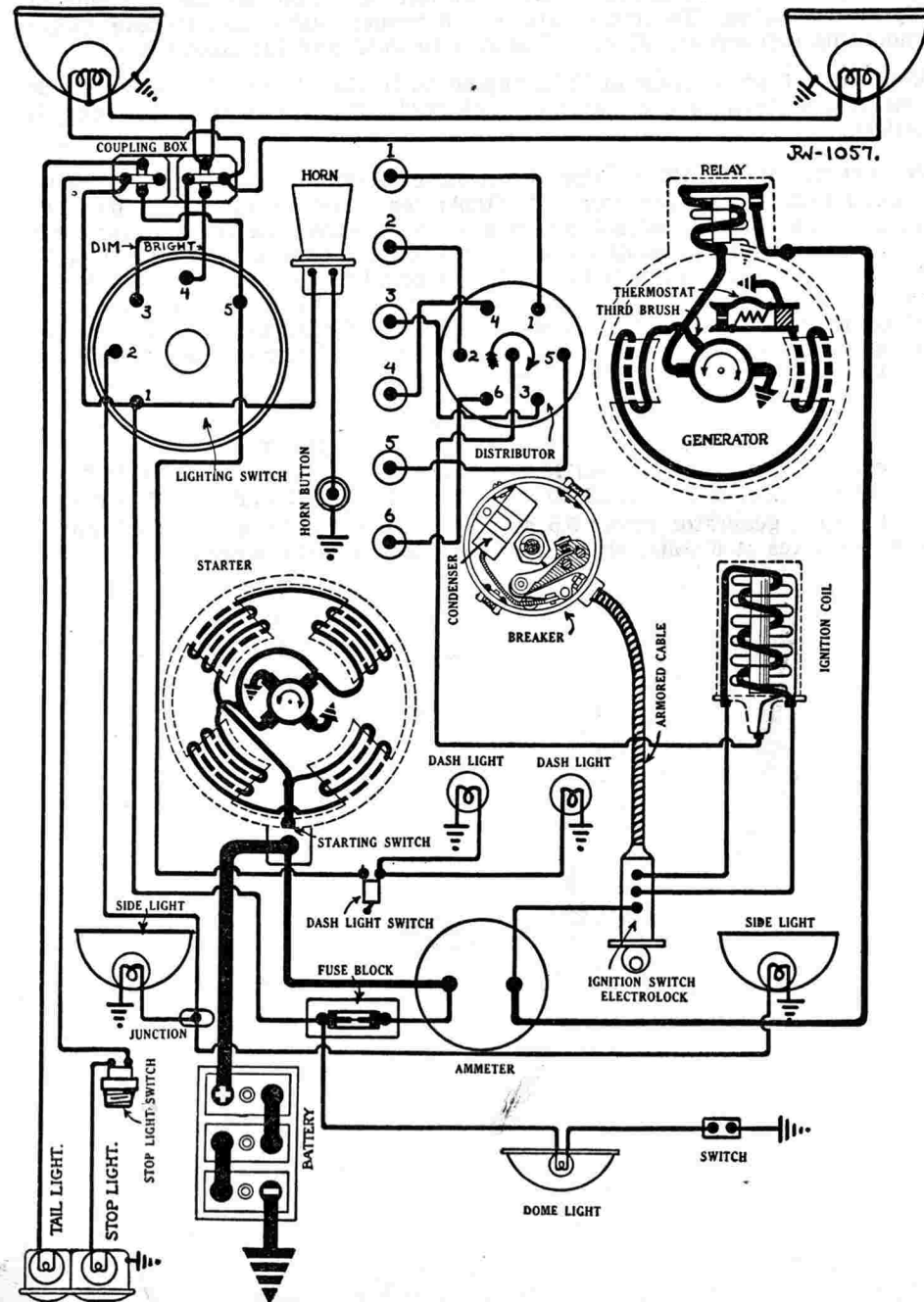
**Oiling:**—Fill the grease cup on the side of the distributor shaft with medium cup grease and turn down two turns every month or each 1000 miles. Every 2000 miles put a small bit of vaseline on the face of the breaker cam.

**Timing:**—Breaker contacts begin to separate when the piston entering power stroke reaches a position one-half inch (on the flywheel) before top dead center with the manual spark control in the fully advanced position. To set timing, crank engine over until piston No. 1 enters compression stroke (the up stroke with both valves closed). Fully advance spark control. Remove the inspection cover on the flywheel case and continue to crank engine until the flywheel mark 'UDC' is one half inch before the mark on the housing. Then take off distributor cap and loosen the advance arm clamp screw. Rotate the distributor until the contacts begin to separate. Tighten the clamp screw and connect the segment opposite the rotor to the spark plug in cylinder No. 1. Connect the remaining spark plugs in order 5-3-6-2-4 clockwise around the distributor head. There is a small plug in the cylinder head directly above piston in cylinder No. 6. If a timing gauge is available this plug should be removed and the timing gauge screwed into the opening. The engine can then be timed with piston No. 1 on compression stroke but piston position is gauged in cylinder No. 6.

**Firing Order:**—The firing order is 1-5-3-6-2-4.

**Spark Plugs:**—Spark plugs are 18MM. Metric. Gaps are .025 inch.

**VALVE TIMING:**—Inlet valves open at top dead center. To set valve timing, first check tappet clearance. This should be .005 inch (inlet) and .007 inch (exhaust) with engine hot. Then crank engine over until piston No. 6 enters compression stroke. Take out the small pipe plug in the cylinder head



# R E O

## FLYING CLOUD MATE MODEL B2 (1929)

### DELCO-REMY GENERATING, STARTING SYSTEM

### DELCO-REMY IGNITION

directly over piston No. 6 and determine compression stroke by holding the thumb over the hole until compression is felt. Then insert a wire in the hole and crank engine over until piston reaches top dead center when the upward movement of the wire will cease or remove inspection hole cover in flywheel housing and crank engine until the flywheel mark 'UDC' is directly opposite the mark in the housing. Inlet valve in cylinder No. 1 should begin to open at this point. The crankshaft sprocket and the camshaft sprocket are marked to aid in setting valve timing. There should be eleven links in the timing chain between the marks on the two sprockets.

**STARTER:—Model 726-E.** Starter is connected to the engine through a mechanical pinion shift interconnected to the starting switch. The direction of rotation is counter-clockwise, viewed from the commutator end. Brush spring tension is 24-28 ounces.

Starter Data			
Torque	R.P.M.	Volts	Amperes
0 lb. ft.....	6000.....	5.....	65
15 ".....	Lock.....	3.15.....	570

**Mounting:—**Starter is flange mounted at left of engine on forward side of flywheel housing. To remove starter, disconnect pedal rod linkage and cable and remove flange mounting cap screws. Then pull starter forward and lift from place.

**Oiling:—**Put 4 or 5 drops of oil in the bearing oiler every month or each 1000 miles.

**GENERATOR:—Model 955-L.** The direction of rotation is counter-clockwise, viewed from the commutator end. Generator current regulation is by third brush shunt field and thermostat. Thermostat contacts open at 165°F. cutting the resistance across the thermostat contacts in series with the shunt field and reducing the output approximately 40%. To adjust generator output, remove the commutator cover band and loosen the small round headed screw on the generator end plate. Then shift the third brush by hand in a counter-clockwise direction to increase the charging rate and in the oppo-

site direction to decrease the charging rate. Tighten the screw after making the adjustment. With standard car setting maximum charging rate is 19 amperes (cold) reached at 1450 R.P.M. or 25 miles per hour.

Generator Data					
Cold Test			Hot Test		
Amperes	Volts	R.P.M.	Amperes	Volts	R.P.M.
19-21.....	8.5.....	1450	9-12.....	7.35-7.65.....	1800-2000

Motoring, generator draws 5.5 amperes at 6 volts. Shunt field current is 4-6.1 amperes at 6 volts. Brush spring tension is 14-18 ounces.

**Mounting:—**Generator is flange mounted at right of engine on rear of timing chain case. To remove generator, disconnect lead and take out two flange mounting cap screws. Then pull generator to rear and lift from place.

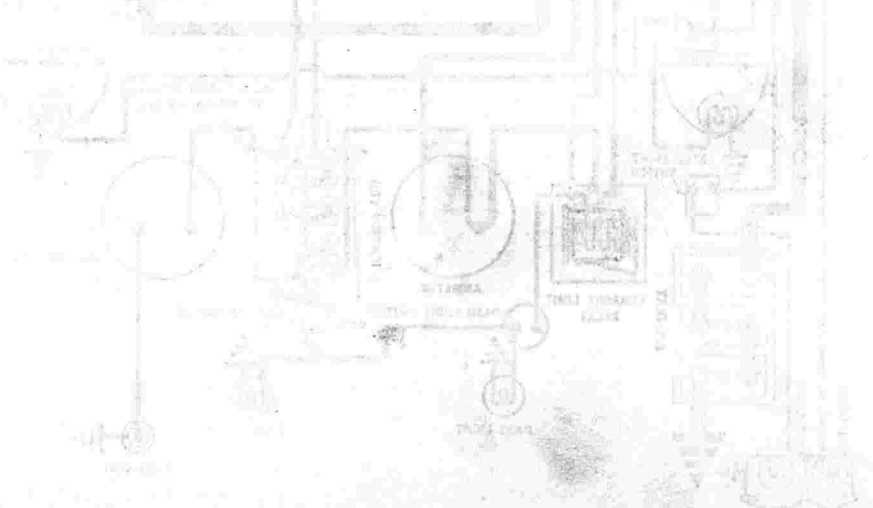
**Adjustment of Timing Chain:—**Timing chain is adjusted by shifting the generator. To adjust chain, loosen the flange mounting screws and turn up the adjusting set screw until the chain begins to hum with the engine running. Then back off the set screw until the chain runs noiselessly and tighten the mounting screws.

**Oiling:—**Put 8 or 10 drops of light engine oil in each of the generator bearing oilers every month or each 1000 miles.

**RELAY:—Model 265-B.** Relay is mounted on the generator. Relay contacts close at 8-10 M.P.H. when the voltage of the generator reaches 7-7.5 volts and open with a discharge current of 0-2.5 amperes. Charging current at closing of contacts is approximately 3 amperes. Contacts separate .015-.025 inch. Air gap is .014-.021 inch with contacts closed.

**LIGHTING:—Delco-Remy Switch Model 482-F.** Lighting switch is mounted at lower end of steering column. Headlights are double filament using the second 21 cp. filament instead of dimmers. Headlights are 6-8 volt, 21-21 cp. D.C. Mazda 1110. Stop light is 6-8 volt, 15 cp. S.C. Mazda 87. Side lights are 6-8 volt, 3 cp. S.C. Mazda 63. Dash and tail lights are each 6-8 volt, 3 cp. S.C. Mazda 63.

**FUSES:—**Lighting fuse mounted on block on dash is 20 ampere capacity.





# ROOSEVELT

SERIAL NUMBERS S-70-500, S-71-500, S-72-500 UP  
PRODUCTION STARTED MARCH 1929  
DELCO-REMY GENERATING, STARTING SYSTEM  
DELCO-REMY IGNITION

**BATTERY:**—National Battery. The positive (+) terminal is grounded. Starting capacity (20 minute rate) is 120 amperes for 20 minutes. Lighting capacity (5 ampere rate) is 5 amperes for 22 hours. Battery is mounted at left of chassis under the driver's seat.

**IGNITION:**—Coil Model 528-R. The ignition switch is incorporated in the base of the coil. Coil is mounted on the back of the instrument board with the switch extending through to the face of the instrument panel. Ignition current is 2 amperes at 6 volts with engine running and 3 amperes at 6 volts with engine stopped.

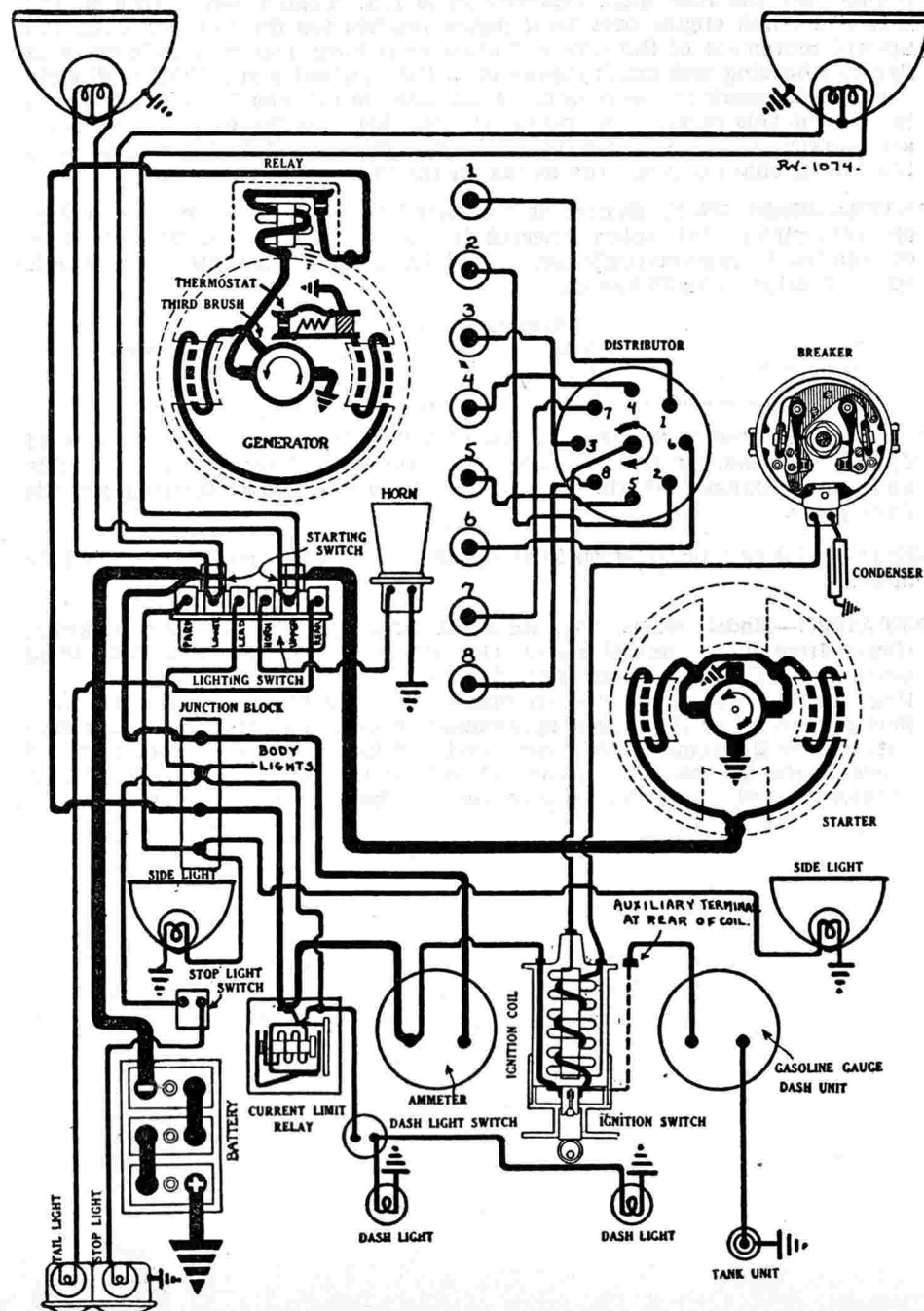
**Distributor Model 658-A.** Breaker contacts separate .022 inch. Set contact gap by loosening lock screw on stationary contact mounting plate and turning eccentric adjusting screw until correct gap is secured with breaker arm on lobe of cam. Resurface contacts when necessary with a fine flat contact file or on a medium hard oilstone. Breaker arm spring tension is 17-21 ounces. Distributor is semi-automatic. Maximum manual advance is 20 degrees (engine). Automatic advance begins at 500 R.P.M. (engine). Maximum automatic advance is 25 degrees reached at 2600 R.P.M. Breaker has two sets of contacts on a four sided cam. Contacts open alternately at intervals of 45 degrees corresponding to 90 degrees of crankshaft rotation. This is the correct firing interval and contacts must be synchronized for proper performance. See Timing.

**Mounting:**—Distributor is mounted on the cylinder head. To remove distributor, disconnect primary lead and manual spark control wire and remove distributor head with cables intact. Then remove manual advance stop screw and lift distributor from place.

**Oiling:**—Fill the grease cup on the side of the distributor shaft with medium cup grease and turn down one turn every 750 miles. Every 1000 miles remove the distributor head and rotor and saturate the wick oiler in the center of the shaft with light engine oil and put a small bit of vaseline on the face of the breaker cam.

**Timing:**—**Synchronization of Contacts:**—To synchronize contacts, use special tool, Delco-Remy Part No. 820738, and follow directions on Page S-31. Contacts can be synchronized after distributor has been timed to the engine without the tool if the engine is cranked over 90 degrees from firing position of piston No. 1 when piston No. 6 will reach a position  $7\frac{1}{2}$  degrees or two teeth on the flywheel before top dead center. If the second set of contacts do not open at this point, loosen the two lock screws and turn the eccentric adjusting screw until contacts begin to separate. Tighten the lock screws and check the contact gap with the breaker arm on the lobe of the cam. If outside limits of .018-.024 inch, reset at .022 inch and repeat synchronization.

**Timing Distributor to Engine:**—Breaker contacts begin to separate when the piston entering power stroke reaches a position  $7\frac{1}{2}$  degrees or two teeth on the flywheel before top dead center with the manual spark control in the fully advanced position. To set timing, crank engine over until piston No. 1 enters compression stroke (the up stroke with both valves closed). Fully advance spark control and continue to crank engine until piston reaches firing position when flywheel mark 'IGN' will be opposite the indicator in the inspection hole in the upper flywheel housing. Then loosen advance arm clamp screw and rotate distributor until contacts begin to open. Tighten the clamp screw and connect the segment opposite the rotor



# ROOSEVELT

SERIAL NUMBERS S-70-500, S-71-500, S-72-500 UP  
PRODUCTION STARTED MARCH 1929  
DELCO-REMY GENERATING, STARTING SYSTEM  
DELCO-REMY IGNITION

to the spark plug in cylinder No. 1. Connect the remaining spark plugs in order 6-2-5-8-3-7-4 clockwise around the distributor head.

**Firing Order:**—The firing order is 1-6-2-5-8-3-7-4.

**Spark Plugs:**—Spark plugs are  $\frac{7}{8}$ -18 S.A.E. Standard. Gaps are .025 inch.

**VALVE TIMING:**—**INLET VALVES:**—Head diameter, 1  $\frac{15}{32}$  inches. Stem diameter, .3095 inch. Stem length, 4  $\frac{61}{64}$  inches. Valve lift,  $\frac{21}{64}$  inch. Spring pressure, 43 pounds valve closed, and 80 pounds valve open. Tappet clearance, .006-.008 inch (hot). Inlet valves open 6 degrees before top dead center and close 40 degrees after lower dead center.

**EXHAUST VALVES:**—Head diameter, 1  $\frac{11}{32}$  inches. Stem diameter, .3085 inch. Stem length, 4  $\frac{61}{64}$  inches. Valve lift,  $\frac{21}{64}$  inch. Spring pressure, 43 pounds valve closed, and 80 pounds valve open. Tappet clearance, .006-.008 inch (hot). Exhaust valves open 40 degrees before lower dead center and close 6 degrees after top dead center.

**STARTER:**—Model 714-C. Starter is connected to the engine through a Bendix drive. The direction of rotation is counter-clockwise, viewed from the commutator end. Brush spring tension is 24-28 ounces. Starter switch is combined with the lighting switch at the lower end of the steering column.

Starter Data			
Torque	R.P.M.	Volts	Amperes
0 lb. ft.	5000	5	65
12 " "	Lock	3.63	475

**Mounting:**—Starter is flange mounted at left of engine on forward side of fly-wheel housing. To remove starter, disconnect cable and remove three flange mounting cap screws. Then pull starter forward and lift from place.

**Oiling:**—Put 4 or 5 drops of light engine oil in the oiler on the commutator end of the starter every 750 miles. The drive end bearing is oilless.

**GENERATOR:**—Model 949-X. The direction of rotations is counter-clockwise, viewed from the commutator end. Generator current regulation is by third brush shunt field and thermostat. Thermostat contacts open at 165°F. cutting the resistance across the thermostat contacts in series with the shunt field and reducing the output approximately 40%. To adjust generator output, loosen the small round headed screw on the generator end plate and remove the commutator cover band. Then shift the third brush by hand in a counter-clockwise direction to increase the charging rate and in the oppo-

site direction to decrease the charging rate. Tighten the screw after making the adjustment. With standard car setting the maximum charging rate is 9-12 amperes (hot) reached at 2000 R.P.M. or 25 M.P.H.

Generator Data					
Cold Test			Hot Test		
Amperes	Volts	R.P.M.	Amperes	Volts	R.P.M.
21	8.5	1450	12	7.5	2000

Motoring, generator draws 6 amperes at 6 volts. Shunt field current is 5 amperes at 6 volts. Brush spring tension is 14-18 ounces.

**Mounting:**—Generator is mounted at left of engine by special swinging bracket and is driven by the fan belt. To remove generator, disconnect lead and remove clamp bolt. Then remove two bolts in bracket and lift generator from place.

**Belt Adjustment:**—Loosen clamp bolt and swing generator away from engine until proper belt tension is secured. Tighten clamp bolt. Be careful not to get too much tension on the belt or it will crowd the generator bearings.

**Oiling:**—Put 4 or 5 drops of light engine oil in the oiler at each end of the generator every 750 miles.

**RELAY:**—Model 265-B. Relay is mounted on the generator. Relay contacts close at 575 R.P.M. or 10 M.P.H. when the generator voltage reaches 6.75-7.5 volts and open at 8 M.P.H. with a discharge current of 0-2.5 amperes. Relay contacts separate .015-.025 inch. Air gap is .014-.021 inch with contacts closed.

**LIGHTING:**—'Aid' Switch Lighting switch is mounted at lower end of steering column. It is of the 'Finger Tip' control type and incorporates the starting switch and horn button with the lighting switch. Headlights are 'Twolite' double filament using the second 21 cp. filament instead of dimmers. Headlights are 6-8 volt, 21-21 cp. D.C. Mazda 1110. Side lights are 6-8 volt, 3 cp. S.C. Mazda 63. Stop light is 6-8 volt, 15 cp. S.C. Mazda 87. Dome light is 6-8 volt, 3 cp. D.C. Mazda 64. Dash and tail lights are each 6-8 volt, 3 cp. S.C. Mazda 63.

**CURRENT LIMIT RELAY:**—Model 410-C. This device is a vibrating circuit breaker mounted on the dash and connected in the lighting circuits. It begins to operate when the current reaches 20-30 amperes and continues limiting the current to 2-15 amperes. Contacts separate .012-.030 inch. Air gap is .019-.025 inch with contacts closed.

# STUDEBAKER

## DICTATOR EIGHT MODEL FC.

### DELCO-REMY GENERATING, STARTING SYSTEM DELCO-REMY IGNITION

**BATTERY:**—Willard, Type SJWR-3, 6 volt. The positive (+) terminal is grounded. Starting capacity (20 minute rate) is 104 amperes for 20 minutes. Lighting capacity (5 ampere rate) is 5 amperes for 18 hours. Battery is mounted on left frame member under front floor boards.

**IGNITION:**—Coil Model 528-E. Ignition coil is mounted on dash. Ignition current is  $\frac{1}{2}$ -2 $\frac{1}{2}$  amperes at 6 volts with engine running and 4-5 amperes at 6 volts with engine stopped.

**Distributor Model 658-Z.** Breaker contacts separate .022 inch. Set breaker gap by loosening lock screw on stationary contact mounting plate and turning eccentric adjusting screw until proper gap is secured with breaker arm on lobe of cam. Distributor has two sets of contacts and a four sided breaker cam. Contacts open alternately at intervals of 45 degrees corresponding to 90 degrees of crankshaft rotation. This interval is correct and contacts must be synchronized for proper performance. See Timing. Distributor is semi-automatic. Maximum manual advance is 25 degrees (engine). Automatic advance begins at 600 R.P.M. (engine). Maximum automatic advance is 22 degrees reached at 2800 R.P.M. Breaker arm spring tension is 17-21 ounces.

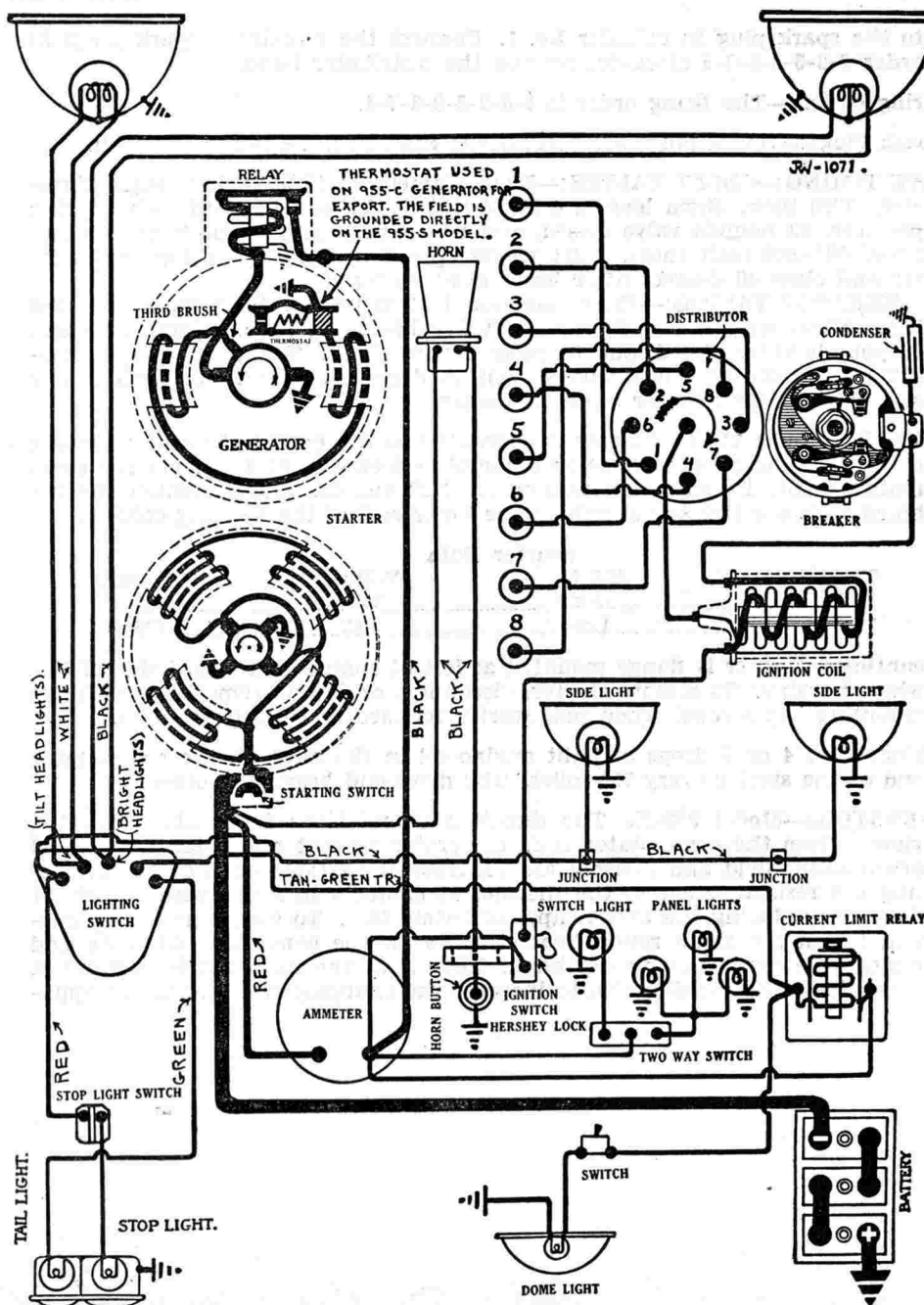
**Mounting:**—Distributor is mounted on the cylinder head. To remove distributor, disconnect primary lead and manual advance rod and remove head with cables intact. Then loosen advance arm clamp screw and lift distributor from place.

**Oiling:**—Fill the grease cup on the side of the distributor shaft and turn down two turns every six weeks or each 2500 miles. At the same time remove the distributor head and rotor and saturate the wick oiler in the center of the shaft with light engine oil.

**Timing:**—**Synchronization of Contacts:**—To synchronize contacts, use Delco-Remy Tool No. 820738 and follow directions on Page S-31. Contacts can be synchronized without use of tool after distributor is timed to engine by cranking engine over 90 degrees when piston No. 6 will reach firing position. The second set of contacts should separate at this point. If they do not, loosen two lock screws on mounting plate and turn eccentric adjusting screw until contacts open. Check contact gaps with breaker arm on lobe of cam. If outside limits of .018-.024 inch, reset at .022 inch and repeat synchronizing operation.

**Timing Distributor to Engine:**—Breaker contacts begin to separate when the piston entering power stroke reaches a position 17 degrees (on the flywheel) after top dead center with the manual spark control in the fully retarded position. To set timing, crank engine over until piston No. 1 enters compression stroke (the up stroke with both valves closed). Fully retard spark lever. Continue to crank engine until piston reaches firing position. Then loosen advance arm clamp screw and rotate distributor in a counter-clockwise direction until one set of contacts begins to separate. Tighten the clamp screw.

The engine can be timed at upper dead center with the flywheel mark 'UDC1-8' at the indicator if the spark lever is fully retarded and then advanced two thirds. This method is advised if contacts are synchronized without special tool. To synchronize contacts, crank engine over 90 degrees when the flywheel mark 'UDC3-6' will be opposite the indicator with piston No. 6 on top dead center. The second set of contacts should be set to open at this point. Connect the spark plug cables in order 1-6-2-5-8-3-7-4 clockwise around the distributor head.





# STUDEBAKER

## DICTATOR EIGHT MODEL FC.

### DELCO-REMY GENERATING, STARTING SYSTEM

### DELCO-REMY IGNITION

**Firing Order:**—The firing order is 1-6-2-5-8-3-7-4.

**Spark Plugs:**—Spark plugs are S.A.E. Standard  $\frac{7}{8}$ -18 Champion No. 4. Gaps are .025 inch.

**VALVE TIMING:**—**INLET VALVES:**—Head diameter, 1  $\frac{13}{32}$  inches. Stem diameter,  $\frac{5}{16}$  inch. Stem length, 5  $\frac{7}{32}$  inches (over all). Valve lift,  $\frac{5}{16}$  inch. Tappet clearance, .004 inch (hot). Spring pressure, 63 to 68 pounds. Inlet valves open at top dead center and close 48 degrees after lower dead center.

**EXHAUST VALVES:**—Head diameter, 1  $\frac{9}{32}$  inches. Stem diameter,  $\frac{5}{16}$  inch. Stem length, 5  $\frac{7}{32}$  inches (over all). Valve lift,  $\frac{5}{16}$  inch. Tappet clearance, .006 inch (hot). Spring pressure, 63 to 68 pounds. Exhaust valves open 43 degrees before lower dead center and close 5 degrees after top dead center. Valve stem guides are removable. Oversize valves are not made.

**STARTER:**—Model 726-G. Starter is connected to the engine through a manual pinion shift interconnected to the starting switch. The direction of rotation is counter-clockwise, viewed from the commutator end. Starter draws 275 amperes cranking engine. Brush spring tension is 24-28 ounces.

Starter Data			
Torque	R.P.M.	Volts	Amperes
0 lb. ft.	6000	5	65
15 "	Lock	3.15	570

**Mounting:**—Starter is flange mounted at left of engine on forward side of fly-wheel housing. To remove starter, disconnect cable and starting pedal rod. Remove flange mounting cap screws and pull starter forward.

**Oiling:**—Put 4 or 5 drops of light engine oil in the oiler on the commutator end of the starter every six weeks or each 2500 miles. The drive end bearing is oilless.

**GENERATOR:**—Model 955-S, 955-C (Export). The direction of rotation is counter-clockwise, viewed from the commutator end. Generator current regulation is by third brush shunt field and thermostat on the Model 955-C. Model 955-S is not equipped with thermostat. Thermostat contacts open at 165°F. cutting the resistance across the thermostat contacts in series with the field and reducing the output approximately 40%. To adjust generator output, remove the commutator cover band and loosen the small round headed

screw on the commutator end plate. Then shift the third brush in a counter-clockwise direction to increase the charging rate and in the opposite direction to decrease the output. Tighten the screw. With standard car setting, the maximum charging rate is 19.5 amperes (cold) reached at 1650 R.P.M. or 27 miles per hour.

Generator Data					
Cold Test			Hot Test		
Amperes	Volts	R.P.M.	Amperes	Volts	R.P.M.
19-21	8.35-8.5	1450	9-12	7.35-7.65	1800-2000

Motoring, generator draws 5.5 amperes at 6 volts. Shunt field current is 4-6.1 amperes at 6 volts. Brush spring tension is 14-18 ounces.

**Mounting:**—Generator is cradle mounted at left of engine and is driven by the fan belt. The water pump is driven by an extension of the generator shaft. To remove generator, disconnect pump coupling and relay lead and loosen mounting strap. Then slip off drive belt and lift generator from place.

**Oiling:**—Put 4 or 5 drops of light engine oil in the generator oilers every six weeks or each 2500 miles.

**RELAY:**—Model 265-B. Relay is mounted on the generator. Relay contacts close at 550 R.P.M. or 10 M.P.H. when the generator voltage reaches 6.4 volts and open with a discharge current of 1-2.5 amperes. Contacts separate .015-.025 inch. Air gap is .014 inch with contacts closed.

**LIGHTING:**—Delco-Remy Switch Model 486-E. Switch is mounted at base of steering column. Double filament headlights are used instead of dimming. Headlights are 6-8 volt, 21-21 cp. D.C. Mazda 1110. Side lights are 6-8 volt, 3 cp. S.C. Mazda 63. Stop light is 6-8 volt, 15 cp. S.C. Mazda 87. Dash and tail lights are each 6-8 volt, 3 cp. S.C. Mazda 63. Dome light is 6-8 volt, 6 cp. S.C. Mazda 81.

**CURRENT LIMIT RELAY:**—Model 410-C. This is a vibrating circuit breaker mounted on the dash and connected in the lighting circuits. The circuit breaker begins to operate with a current flow of 25-30 amperes limiting the current to 15 amperes. Contact gap is .012-.030 inch. Air gap is .019-.025 inch.

# STUDEBAKER

## COMMANDER SIX MODEL GJ

### SERIAL NUMBERS 4,070,501 UP

### DELCO-REMY GENERATING, STARTING SYSTEM

### DELCO-REMY IGNITION

**BATTERY:**—Willard, Type SJWR-3. The positive (+) terminal is grounded. Starting capacity is 104 amperes for 20 minutes. Lighting capacity (5 ampere rate) is 5 amperes for 18 hours. Battery is mounted under front floor boards on right frame member.

**IGNITION:**—Coil Model 528-E. Ignition coil is mounted on the dash. Ignition current is  $\frac{1}{2}$ -2 $\frac{1}{2}$  amperes at 6 volts with engine running and 4-5 amperes at 6 volts with engine stopped.

**Distributor Model 636-Y.** Breaker contacts separate .018-.024 inch. Set contact gap by loosening lock screw on stationary contact mounting bracket and turning up contact stud until proper gap is secured with breaker arm on lobe of cam. Resurface contacts when necessary with a fine flat contact file or on a medium hard oilstone. Distributor is semi-automatic. Maximum manual advance is 15 degrees (engine). Automatic advance begins at 600 R.P.M. (engine). Maximum automatic advance is 32 degrees at 3000 R.P.M. Breaker arm spring tension is 18-21 ounces.

**Mounting:**—Distributor is mounted on accessory bracket at right of engine. To remove distributor, disconnect primary lead and manual advance rod and remove distributor head with cables intact. Then loosen clamping plate screw and lift distributor from place.

**Oiling:**—Fill the grease cup on the side of the distributor shaft with medium cup grease and turn down two turns every six weeks or each 2500 miles. At the same time remove the distributor head and rotor and put 3 or 4 drops of light engine oil in the wick oiler in the center of the shaft.

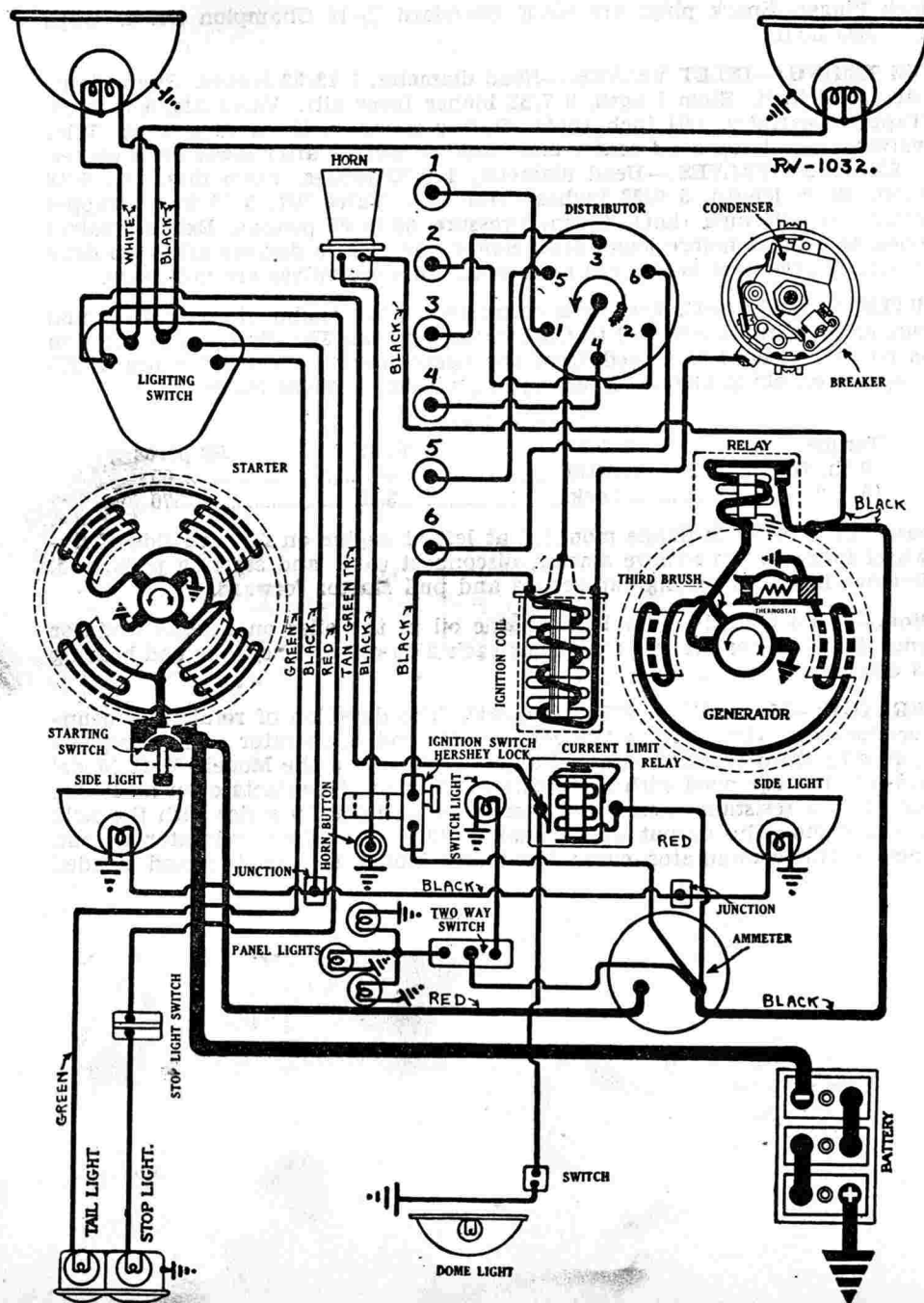
**Timing:**—Breaker contacts begin to separate when the piston entering power stroke reaches a position  $7\frac{1}{2}$  degrees after top dead center with the spark control lever in the fully retarded position. To set timing, crank engine over until piston No. 1 enters compression stroke (the up stroke with both valves closed). Fully retard spark lever and then advance it exactly one half. Continue to crank engine until piston reaches top dead center when the flywheel mark 'UDC1-6' will be opposite the indicator on the flywheel case. Loosen the advance arm clamp bolt and rotate the distributor until the contacts begin to separate. Tighten the clamp bolt and connect the terminal opposite the rotor to the spark plug in cylinder No. 1. Connect the remaining spark plugs in order 4-2-6-3-5 counter-clockwise around the distributor head.

**Firing Order:**—The firing order is 1-4-2-6-3-5.

**Spark Plugs:**—Spark plugs are S.A.E. Standard  $\frac{7}{8}$ -18. Champion No. 4. Gaps are .025 inch.

**VALVE TIMING:**—INLET VALVES:—Head diameter,  $1\frac{5}{8}$  inches. Stem diameter,  $\frac{5}{16}$  inch. Stem length,  $5\frac{3}{8}$  inches (over all). Valve lift,  $\frac{5}{16}$  inch. Tappet clearance, .003-.005 inch (cold). Spring pressure, 63 to 68 pounds. Inlet valves open 5 degrees after top dead center and close 53 degrees after lower dead center.

EXHAUST VALVES:—Head diameter,  $1\frac{1}{2}$  inches. Stem diameter,  $\frac{5}{16}$  inch. Stem length,  $5\frac{3}{8}$  inches (over all). Valve lift,  $\frac{5}{16}$  inch. Tappet clearance, .005-.007 inch (cold). Spring pressure, 63 to 68 pounds. Exhaust valves open 38 degrees before lower dead center and close 10 degrees after top dead center. The flywheel is marked 'INT.OP1-6' at a point 5 degrees after the top dead center mark 'UDC1-6'. Valve stem guides are removable. Oversize valves are not made.



# STUDEBAKER

## COMMANDER SIX MODEL GJ

### SERIAL NUMBERS 4,070,501 UP

#### DELCO-REMY GENERATING, STARTING SYSTEM

#### DELCO-REMY IGNITION

**STARTER:—Model 726-F.** Starter is connected to the engine through a manual pinion shift interconnected with the starting switch. The direction of rotation is counter-clockwise, viewed from the commutator end. Starter draws 275 amperes cranking engine. Brush spring tension is 24-28 ounces.

Starter Data			
Torque	R.P.M.	Volts	Amperes
0 lb. ft.	5000	5	65
15 "	Lock	3.2	575

**Mounting:—**Starter is flange mounted at left of engine on forward side of flywheel housing. To remove starter, disconnect cable and starting pedal rod. Then remove flange mounting cap screws and lift starter from place.

**Oiling:—**Put 4 or 5 drops of light engine oil in the oiler on the commutator end of the starter every six weeks or each 2500 miles. The drive end bearing is oilless.

**GENERATOR:—Model 949-J.** The direction of rotation is counter-clockwise, viewed from the commutator end. Generator current regulation is by third brush shunt field and thermostat. Thermostat contacts open at 170°F. cutting the resistance across the thermostat contacts in series with the field and reducing the output approximately 40%. To adjust generator output, remove the commutator cover band and loosen the small round headed screw on the generator end plate. Then shift the third brush by hand in a counter-clockwise direction to increase the charging rate and in the opposite direction to decrease the charging rate. With standard car setting, the maximum charging rate is 19.5 amperes (cold) reached at 1650 R.P.M. or 24.2 miles per hour.

Generator Data  
Hot Test

Amperes	Volts	R.P.M.
0	6.4	710
7	7.1	1120
10	7.4	1500
12	7.6	1650
10	7.4	2800

Motoring, generator draws 6 amperes at 6 volts. Shunt field current is 5 amperes at 6 volts. Brush spring tension is 12-18 ounces.

**Mounting:—**Generator is flange mounted at right of engine on rear of accessory bracket. To remove generator, disconnect relay lead and remove flange mounting cap screws. Pull generator to rear and lift from place.

**Oiling:—**Put 4 or 5 drops of light engine oil in each of the generator bearing oilers every six weeks or each 2500 miles.

**RELAY:—Model 265-B.** Relay is mounted on the generator. Relay contacts close at 600 R.P.M. of generator armature or 9.4 M.P.H. when the generator voltage reaches 6.4 volts and open with a discharge current of 1-2.5 amperes. Relay contacts separate .015-.025 inch. Air gap is .014 inch with contacts closed.

**LIGHTING:—Delco-Remy Switch Model 486-E.** Switch is mounted at lower end of steering column. Double filament headlights are used instead of dimming. Headlights are 6-8 volt, 21-21 cp. D.C. Mazda 1110. Side lights are 6-8 volt, 3 cp. S.C. Mazda 63. Stop light is 6-8 volt, 15 cp. S.C. Mazda 87. Dash and tail lights are each 6-8 volt, 3 cp. S.C. Mazda 63. Dome light is 6-8 volt, 6 cp. S.C. Mazda 81.

**CURRENT LIMIT RELAY:—Model 410-C.** This device is a vibrating circuit breaker mounted on the dash and connected in the lighting circuit. It begins to vibrate when the current reaches 29-35 amperes and continues limiting the current to 15 amperes.



# STUDEBAKER

## COMMANDER EIGHT MODEL FD

### SERIAL NUMBERS 8,000,000 UP

### DELCO-REMY GENERATING, STARTING SYSTEM

### DELCO-REMY IGNITION

**BATTERY:**—Willard, Type SJWR-3, 6 volt. The positive (+) terminal is grounded. Starting capacity (20 minute rate) is 104 amperes for 20 minutes. Lighting capacity (5 ampere rate) is 5 amperes for 18 hours. Battery is mounted on left frame member under front floor boards.

**IGNITION:**—Coil Model 528-E. Ignition coil is mounted on dash. Ignition current is  $\frac{1}{2}$ -2 $\frac{1}{2}$  amperes at 6 volts with engine running and 4-5 amperes at 6 volts with engine stopped.

**Distributor Model 658-V.** Breaker contacts separate .022 inch. Set breaker gap by loosening lock screw on stationary contact mounting plate and turning eccentric adjusting screw until proper gap is secured with breaker arm on lobe of cam. Distributor has two sets of contacts and a four sided breaker cam. Contacts open alternately at intervals of 45 degrees corresponding to 90 degrees of crankshaft rotation. This interval is correct and contacts must be synchronized for proper performance. See Timing. Distributor is semi-automatic. Maximum manual advance is 25 degrees (engine). Automatic advance begins at 600 R.P.M. (engine). Maximum automatic advance is 20 degrees reached at 2800 R.P.M. Breaker arm spring tension is 17-21 ounces.

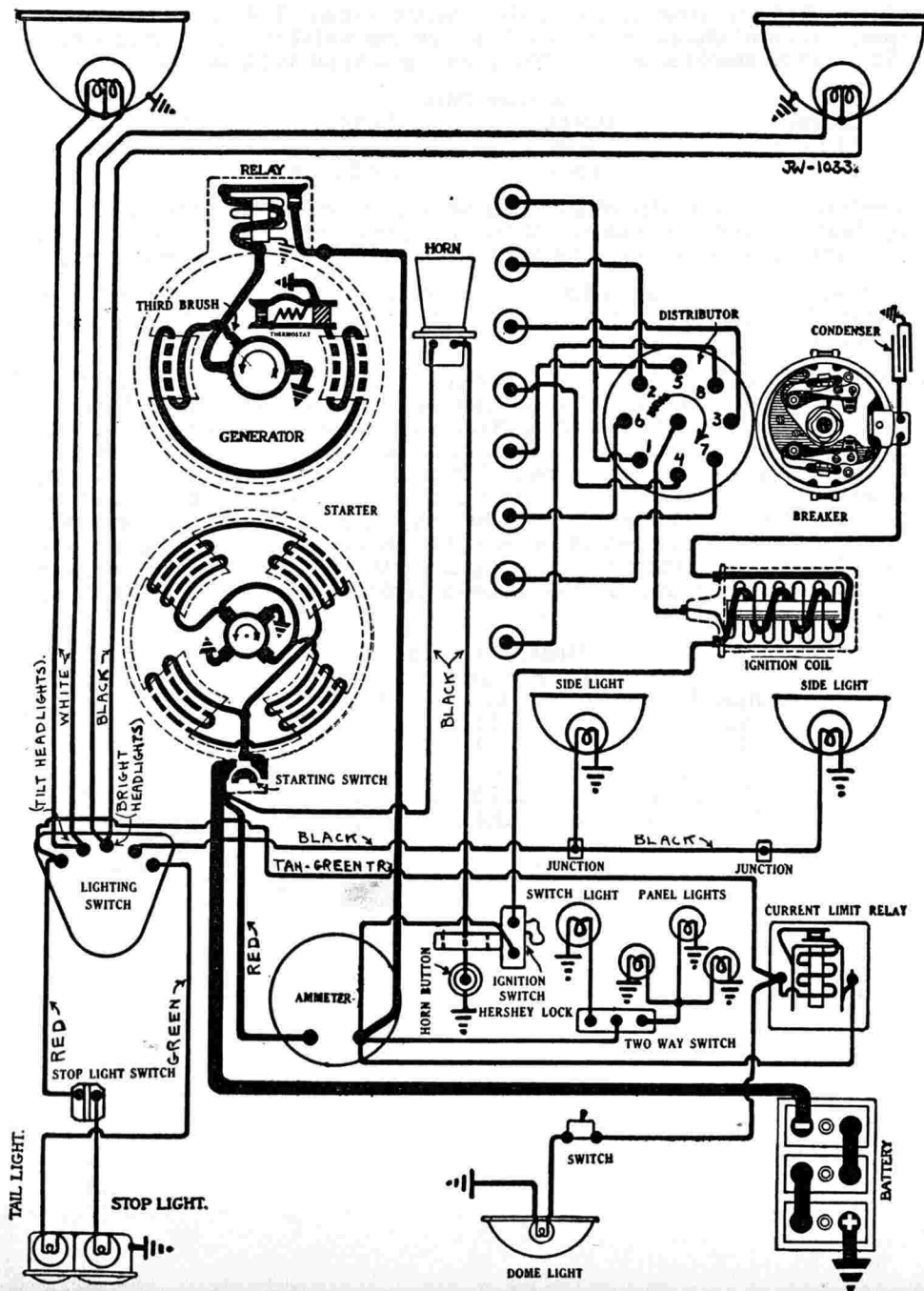
**Mounting:**—Distributor is mounted on the cylinder head. To remove distributor, disconnect primary lead and manual advance rod and remove head with cables intact. Then loosen advance arm clamp screw and lift distributor from place.

**Oiling:**—Fill the grease cup on the side of the distributor shaft and turn down two turns every six weeks or each 2500 miles. At the same time remove the distributor head and rotor and saturate the wick oiler in the center of the shaft with light engine oil.

**Timing:**—Synchronization of Contacts:—To synchronize contacts, use Delco-Remy Tool No. 820738 and follow directions on Page S-31. Contacts can be synchronized without use of tool after distributor is timed to engine by cranking engine over 90 degrees when piston No. 6 will reach firing position. The second set of contacts should separate at this point. If they do not, loosen two lock screws on mounting plate and turn eccentric adjusting screw until contacts open. Check contact gaps with breaker arm on lobe of cam. If outside limits of .018-.024 inch, reset at .022 inch and repeat synchronizing operation.

**Timing Distributor Engine:**—Breaker contacts begin to separate when the piston entering power stroke reaches a position  $\frac{3}{4}$  inch (on the flywheel) before top dead center with the manual spark control in the fully advanced position. To set timing, crank engine over until piston No. 1 enters compression stroke (the upstroke with both valves closed). Fully advance spark lever. Continue to crank engine until piston reaches a position  $\frac{3}{4}$  inch before top dead center when the punch marks on the flywheel (which are  $\frac{3}{4}$  inch before the top dead center mark 'UDC1-8') will be opposite the indicator on the flywheel case. Then loosen advance arm clamp screw and rotate distributor in a counter-clockwise direction until one set of contacts begins to separate. Tighten the clamp screw.

The engine can be timed at upper dead center with the flywheel mark 'UDC1-8' at the indicator if the spark lever is fully advanced and then retarded one third. This method is advised if contacts are synchronized without special tool. To synchronize contacts crank engine over 90 degrees when the flywheel mark 'UDC3-6' will be opposite the indicator, with piston



# STUDEBAKER

## COMMANDER EIGHT MODEL FD

### SERIAL NUMBERS 8,000,000 UP

### DELCO-REMY GENERATING, STARTING SYSTEM

### DELCO-REMY IGNITION

No. 6 on top dead center. The second set of contacts should be set to open at this point. Connect the spark plug cables in order 1-6-2-5-8-3-7-4 clockwise around the distributor head.

**Firing Order:**—The firing order is 1-6-2-5-8-3-7-4.

**Spark Plugs:**—Spark plugs are S.A.E. Standard  $\frac{7}{8}$ -18. Champion No. 4. Gaps are .025 inch.

**VALVE TIMING:**—**INLET VALVES:**—Head diameter, 1  $\frac{13}{32}$  inches. Stem diameter,  $\frac{5}{16}$  inch. Stem length, 5  $\frac{7}{32}$  inches (over all). Valve lift,  $\frac{5}{16}$  inch. Tappet clearance, .004 inch (hot). Spring pressure, 63 to 68 pounds. Inlet valves open at top dead center and close 48 degrees after lower dead center.

**EXHAUST VALVES:**—Head diameter, 1  $\frac{9}{32}$  inches. Stem diameter,  $\frac{5}{16}$  inch. Stem length, 5  $\frac{7}{32}$  inches (over all). Valve lift,  $\frac{5}{16}$  inch. Tappet clearance, .006 inch (hot). Spring pressure, 63 to 68 pounds. Exhaust valves open 43 degrees before lower dead center and close 5 degrees after top dead center. Valve stem guides are removable. Oversize valves are not made.

**STARTER:**—**Model 726-G.** Starter is connected to the engine through a manual pinion shift interconnected with the starting switch. The direction of rotation is counter-clockwise, viewed from the commutator end. Starter draws 275 amperes cranking engine. Brush spring tension is 24-28 ounces.

Starter Data			
Torque	R.P.M.	Volts	Amperes
0 lb. ft.....	6000.....	5 .....	65
15 " .....	Lock.....	3.15.....	570

**Mounting:**—Starter is flange mounted at left of engine on forward side of flywheel housing. To remove starter, disconnect cable and starting pedal rod. Remove flange mounting cap screws and pull starter forward.

**Oiling:**—Put 4 or 5 drops of light engine oil in the oiler on the commutator end of the starter every six weeks or each 2500 miles. The drive end bearing is oilless.

**GENERATOR:**—**Model 955-C.** The direction of rotation is counter-clockwise, viewed from the commutator end. Generator current regulation is by third brush shunt field and thermostat. Thermostat contacts open at 160°F. cutting the resistance across the thermostat contacts in series with the field

and reducing the output approximately 40%. To adjust generator output, remove the commutator cover band and loosen the small round headed screw on the commutator end plate. Then shift the third brush in a counter-clockwise direction to increase the charging rate and in the opposite direction to decrease the output. Tighten the screw. With standard car setting, the maximum charging rate is 19.5 amperes (cold) reached at 1650 R.P.M. or 27 miles per hour.

Generator Data					
Cold Test			Hot Test		
Amperes	Volts	R.P.M.	Amperes	Volts	R.P.M.
19-21.....	8.35-8.5.....	1450	9-12.....	7.35-7.65.....	1800-2000

Motoring, generator draws 5.5 amperes at 6 volts. Shunt field current is 4-6.1 amperes at 6 volts. Brush spring tension is 14-18 ounces.

**Mounting:**—Generator is cradle mounted at left of engine and is driven by the fan belt. The water pump is driven by an extension of the generator shaft. To remove generator, disconnect pump coupling and relay lead and loosen mounting strap. Then slip off drive belt and lift generator from place.

**Oiling:**—Put 4 or 5 drops of light engine oil in the generator oilers every six weeks or each 2500 miles.

**RELAY:**—**Model 265-B.** Relay is mounted on the generator. Relay contacts close at 550 R.P.M. or 9.4 M.P.H. when the generator voltage reaches 6.4 volts and open with a discharge current of 1-2.5 amperes. Contacts separate .015-.025 inch. Air gap is .014 inch with contacts closed.

**LIGHTING:**—**Delco-Remy Switch Model 486-E.** Switch is mounted at base of steering column. Double filament headlights are used instead of dimming. Headlights are 6-8 volt, 21-21 cp. D.C. Mazda 1110. Side lights are 6-8 volt, 3 cp. S.C. Mazda 63. Stop light is 6-8 volt, 15 cp. S.C. Mazda 87. Dash and tail lights are each 6-8 volt, 3 cp. S.C. Mazda 63. Dome light is 6-8 volt, 6 cp. S.C. Mazda 81.

**CURRENT LIMIT RELAY:**—**Model 410-C.** This is a vibrating circuit breaker mounted on the dash and connected in the lighting circuits. The circuit breaker begins to operate with a current flow of 29-35 amperes limiting the current to 15 amperes.

# STUDEBAKER

## PRESIDENT EIGHT

MODEL FE SERIAL NUMBERS 6,013,001 UP

MODEL FH SERIAL NUMBERS 7,013,501 UP

DELCO-REMY GENERATING, STARTING SYSTEM

DELCO-REMY IGNITION

**BATTERY:**—Willard, Type SJWR-4, 6 volt. The positive (+) terminal is grounded. Starting capacity (20 minute rate) is 125 amperes for 20 minutes. Lighting capacity (5 ampere rate) is 5 amperes for 22 hours. Battery is mounted under front floor boards on right frame member.

**IGNITION:**—Coil Model 528-E. Coil is mounted on the dash. Ignition current is  $\frac{1}{2}$ -2 $\frac{1}{2}$  amperes at 6 volts with engine running and 4-5 amperes at 6 volts with engine stopped for each coil.

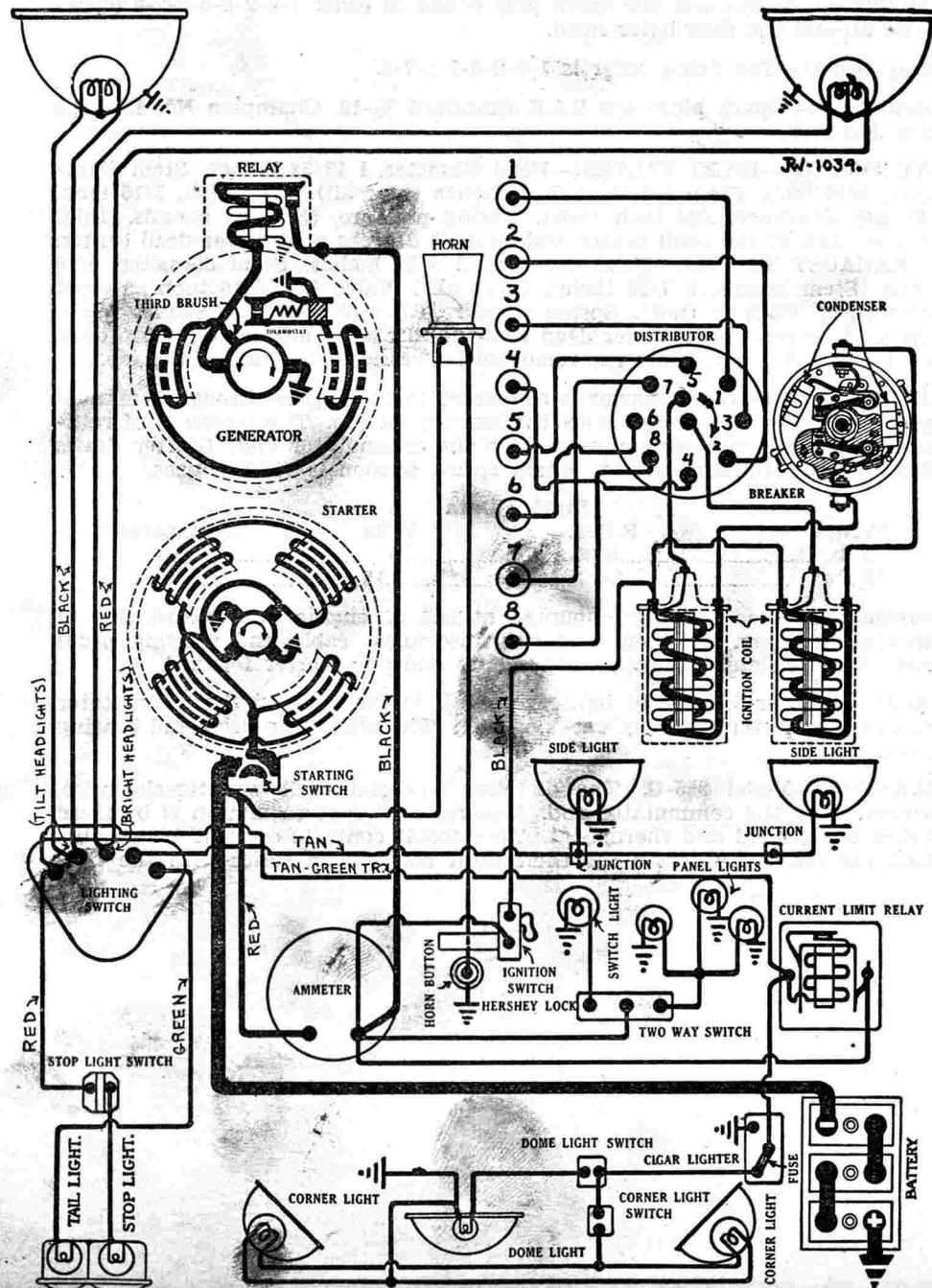
**Distributor Model 668-C.** Breaker contacts separate .018 to .022 inch. Set contact gap by loosening lock screw on stationary contact mounting plate and turning eccentric adjusting screw until proper gap is secured with breaker arm on lobe of cam. Breaker arm spring tension is 18-21 ounces. Resurface contacts when necessary with a fine flat contact file or on a medium hard oilstone. Breaker has two sets of contacts operating on a four sided cam. Each set of contacts controls one ignition coil and fires the spark plugs in four cylinders. Contacts separate alternately at intervals of 45 degrees corresponding to 90 degrees of crankshaft rotation. This is the correct firing interval for the President engine. Contacts must be accurately synchronized for correct performance. See Timing. Distributor is semi-automatic. Maximum manual advance is 25 degrees (engine). Automatic advance begins at 600 R.P.M. (engine). Maximum automatic advance is 17 degrees reached at 3200 R.P.M. (engine).

**Mounting:**—Distributor is mounted on the cylinder head. To remove distributor, disconnect primary leads and manual advance rod and remove distributor head with cables intact. Then loosen advance arm clamp screw and lift distributor from place.

**Oiling:**—Fill the grease cup on the side of the distributor shaft with medium cup grease and turn down two turns every six weeks or each 2500 miles. At the same time remove the distributor head and rotor and saturate the wick in the center of the shaft with light engine oil.

**Timing:**—**Synchronization of Contacts:**—Follow directions on Page S-31 to synchronize contacts. Contacts can be synchronized without use of special tool after distributor is timed to engine by cranking engine over 90 degrees from firing position of piston No. 1 when piston No. 6 will reach firing position. If the second set of contacts do not separate at this point, loosen the two lock screws and turn the eccentric adjusting screw until contacts begin to open. Then check contact gap with breaker arm on lobe of cam. If outside limits of .018-.024 inch, reset at .022 inch and repeat synchronizing operation.

**Timing Distributor to Engine:**—Breaker contacts begin to separate when the piston entering power stroke reaches a position 1 inch (on the flywheel) before top dead center with manual spark control fully advanced. To set timing, crank engine over until piston No. 1 enters compression stroke (the up stroke with both valves closed). Fully advance spark lever. Continue to crank engine until piston reaches a position 1 inch before top dead center when the punch marks on the flywheel (which are 1 inch before the top dead center mark 'UDC1-8') will be opposite the indicator on the flywheel case. Then loosen advance arm clamp screw and rotate distributor counter-clockwise until one set of contacts begin to open. Tighten the clamp screw and connect the terminal directly over the carbon brush of the rotor to the spark plug in cylinder No. 1. Connect the remaining plugs in order 3-2-4-8-6-7-5 clockwise around the distributor head (see diagram).





# STUDEBAKER

## PRESIDENT EIGHT

MODEL FE SERIAL NUMBERS 6,013,001 UP

MODEL FH SERIAL NUMBERS 7,013,501 UP

DELCO-REMY GENERATING, STARTING SYSTEM

DELCO-REMY IGNITION

The engine can be timed at upper dead center with the flywheel mark 'UDC1-8' opposite the indicator if the spark control lever is fully advanced and then retarded one third. This method is advised if contacts are synchronized as part of timing operation. To synchronize contacts, crank engine over until piston No. 6 reaches top dead center when the flywheel mark 'UDC3-6' will be opposite the indicator. The second set of contacts should separate at this point.

**Firing Order:**—The firing order is 1-6-2-5-8-3-7-4.

**Spark Plugs:**—Spark plugs are Champion No. 4. Gaps are .025 inch.

**VALVE TIMING:**—**INLET VALVES:**—Head diameter, 1 21/32 inches. Stem diameter, 3/8 inch. Stem length, 5 5/8 inches (over all). Valve lift, 11/32 inch. Tappet clearance, .003 inch (cold). Spring pressure, 98 to 108 pounds. Inlet valves open 5 degrees after top dead center and close 45 degrees after lower dead center.

**EXHAUST VALVES:**—Head diameter, 1 9/16 inches. Stem diameter, 3/8 inch. Stem length, 5 5/8 inches (over all). Valve lift, 11/32 inch. Tappet clearance, .007 inch (cold). Spring pressure, 98 to 108 pounds. Exhaust valves open 40 degrees before lower dead center and close 12 degrees after top dead center. The flywheel is marked 'IN/OP1-8' at a point 5 degrees after the top dead center mark for cylinders 1 and 8. Valve stem guides are removable. Oversize valves are not made.

**STARTER:**—Model 728-C. Starter is connected to the engine through reduction gears and a manual pinion shift interconnected with the starting switch. The direction of rotation is clockwise (armature shaft), viewed from the commutator end. Starter draws 175 amperes cranking engine. Brush spring tension is 24-28 ounces.

Starter Data			
Torque	R.P.M.	Volts	Amperes
0 lb. ft.	2500	5	70
28 "	Lock	3	600

**Mounting:**—Starter is flange mounted at left of engine on forward side of flywheel housing. To remove starter, disconnect cable and starting pedal rod and remove flange mounting cap screws. Then pull starter forward and lift from place.

**Oiling:**—Put 4 or 5 drops of light engine oil in the oiler at each end of the armature shaft every six weeks or each 2500 miles. Once each year remove the grease plug in the reduction gear case and repack the gear compartment with medium grease.

**GENERATOR:**—Model 955-C. The direction of rotation is counter-clockwise, viewed from the commutator end. Generator current regulation is by third brush shunt field and thermostat. Thermostat contacts open at 160°F. cutting the resistance across the thermostat contacts in series with the field and reducing the output approximately 40%. To adjust the charging rate, remove the commutator cover band and loosen the small round headed screw on the commutator end plate. Then shift the third brush by hand in a counter-clockwise direction to increase the charging rate and in the opposite direction to decrease the charging rate. Tighten the screw. With standard car setting maximum charging rate is 19.5 amperes (cold) reached at 1650 R.P.M. or 22 M.P.H.

Generator Data					
Cold Test			Hot Test		
Amperes	Volts	R.P.M.	Amperes	Volts	R.P.M.
19-21	8.35-8.5	1450	9-12	7.35-7.65	1800-2000

Motoring, generator draws 5.5 amperes at 6 volts. Shunt field current is 4-6.1 amperes at 6 volts. Brush spring tension is 14-18 ounces.

**Mounting:**—Generator is cradle mounted at left of engine and is driven by the fan belt. The water pump is driven by an extension of the generator shaft. To remove generator, disconnect pump coupling and relay lead and loosen mounting strap. Then slip off drive belt and lift generator from place.

**Oiling:**—Put 4 or 5 drops of light engine oil in each of the generator oilers every six weeks or each 2500 miles.

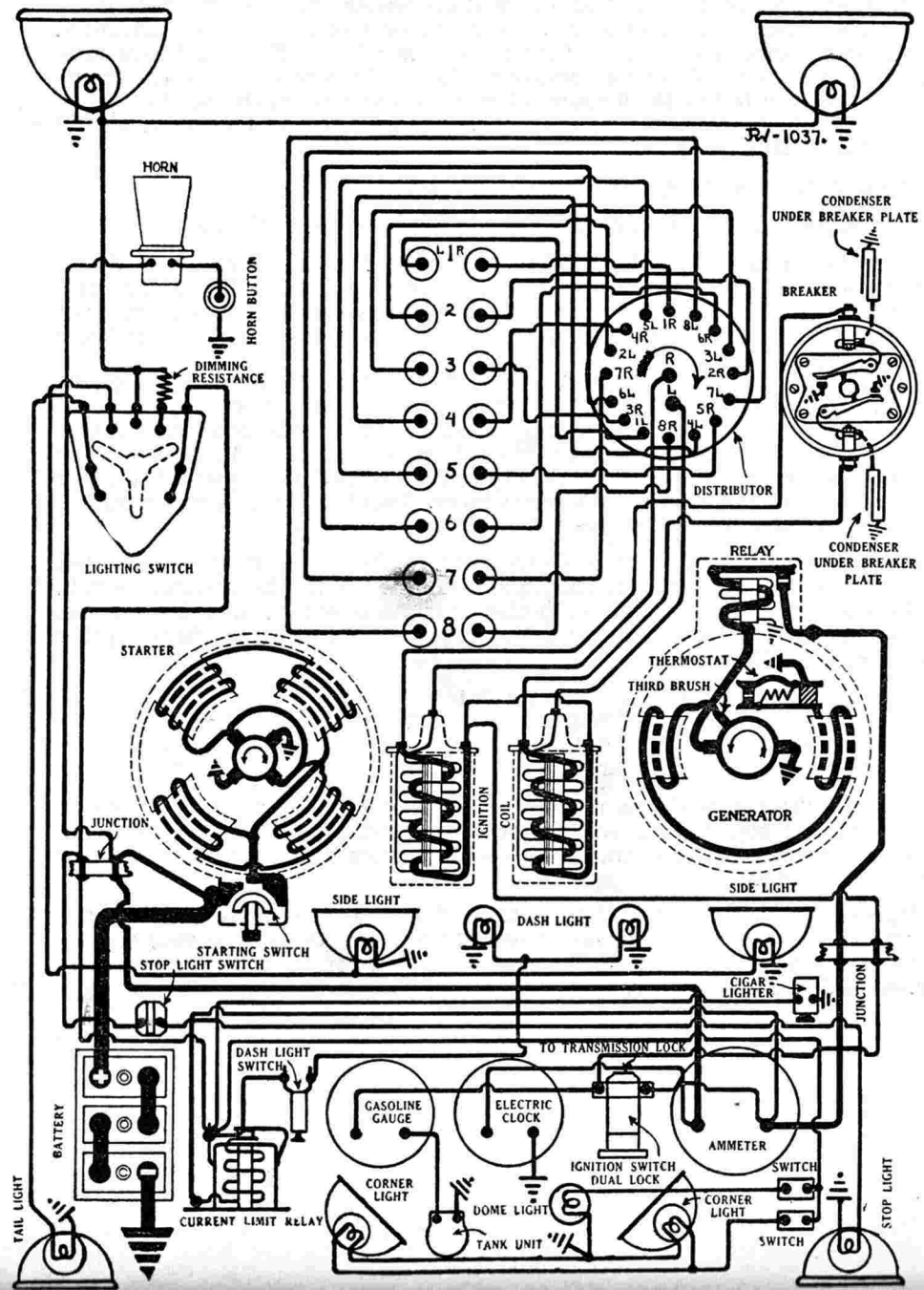
**RELAY:**—Model 265-B. Relay is mounted on the generator. Relay contacts close at 650 R.P.M. or 12.5 M.P.H. when the voltage of the generator reaches 6.4 volts and open with a discharge current of 1-2.5 amperes. Contacts separate .015-.025 inch. Air gap is .014 inch with contacts closed.

**LIGHTING:**—Delco-Remy Switch Model 486-E. Lighting switch is mounted at base of steering column. Double filament headlights are used instead of dimming. Headlights are 6-8 volt, 21-21 cp. D.C. Mazda 1110. Side lights are 6-8 volt, 3 cp. S.C. Mazda 63. Stop light is 6-8 volt, 15 cp. S.C. Mazda 87. Dash and tail lights are each 6-8 volt, 3 cp. S.C. Mazda 63. Dome and corner lights are each 6-8 volt, 6 cp. S.C. Mazda 81.

**CURRENT LIMIT RELAY:**—This device is a vibrating circuit breaker mounted on the dash and connected in the lighting circuits. The circuit breaker begins to vibrate when the current reaches 29-35 amperes and continues limiting the current flow to approximately 15 amperes. Contact opening is .012-.030 inch. Air gap is .019-.025 inch.

**SERIES M (1929) PRODUCTION STARTED DECEMBER 4, 1928**  
**(134½" WHEELBASE) SERIAL NUMBERS 30,001 UP**  
**(145" WHEELBASE) SERIAL NUMBERS 40,001 UP**  
**DELCO-REMY GENERATING, STARTING SYSTEM**  
**DELCO-REMY IGNITION**

**Timing Distributor to Engine:**—Breaker contacts begin to separate when the piston entering power stroke reaches a position 15 degrees before top dead center with the manual spark control lever in the fully advanced position. To set timing, crank engine over until piston No. 1 reaches top dead center on compression stroke (the upstroke with both valves closed) when the flywheel mark 'Top C 1 & 8' will be opposite the indicator on the flywheel case. Then fully retard spark lever and carefully advance it 6/10 of the total range with the ignition turned on. The ammeter reading should drop from an indicated discharge of 12 amperes to '0' at this point. If it drops to 6 amperes and then to '0' the contacts are not properly synchronized. If the ammeter reading does not change, remove the distributor head and rotor and loosen the screw in the center of the breaker cam. Then carefully rotate the cam until the contacts begin to open and the ammeter pointer drops to '0'. Tighten the lock screw and connect the segment oppo-





# STUTZ

## SERIES M (1929) PRODUCTION STARTED DECEMBER 4, 1928 (134 $\frac{1}{2}$ " WHEELBASE) SERIAL NUMBERS 30,001 UP (145" WHEELBASE) SERIAL NUMBERS 40,001 UP DELCO-REMY GENERATING, STARTING SYSTEM DELCO-REMY IGNITION

site the rotor segment connected to the center terminal in the distributor head to the spark plug in cylinder No. 1 on the right side. Connect the remaining spark plugs as shown on the diagram.

**Firing Order:**—The firing order is 1-6-2-5-8-3-7-4. Spark plugs are connected 1R-8L-6R-3L-2R-7L-5R-4L-8R-1L-3R-6L-7R-2L-4R-5L clockwise around the distributor head. Spark plugs are right (R) and left (L) in the cylinder head and No. 1 cylinder is nearest the radiator.

**Spark Plugs:**—Spark plugs are 18 MM. Metric Standard. Gaps are .022 inch.

**VALVE TIMING:**—Specifications:—Head diameter, 1 21/32 inches. Stem diameter, 3/8 inch. Stem length, 6 11/32 inches (top of seat to end of stem). Valve lift, 11/32 inch. Spring pressure, 56 pounds—valve closed (spring length 2 27/64 inches) and 102 pounds—valve open (compressed to 2 5/64 inches). Tappet clearance or lash between valve cap and cam, .028 inch. Valve stem guides are removable. Oversize valves are not made.

**Timing:**—Inlet valves open 7 degrees after top dead center and close 47 degrees after lower dead center. Exhaust valves open 49 degrees before lower dead center and close 7 degrees after top dead center.

**To Set Valve Timing:**—Cam shaft sprocket should be removed from camshaft and automatic adjusting or idling sprocket in upper chain must be off the engine. Crank engine over until piston No. 1 reaches a position 7 degrees after top dead center when the flywheel mark 'EX.CL.1&8 IN.OP.1&8' will be in the exact center of the inspection hole in the upper flywheel housing. Then turn camshaft until the heel of the first cam is directly above No. 1 valve (exhaust valve in cylinder No. 1). Set lash or clearance at .028 inch. This is very important. Then turn camshaft in clockwise direction (direction of rotation) until valve has just closed. This may be determined by inserting pin in hole in valve cap and oscillating valve. The added drag when the valve seats is perceptible. Then mesh camshaft sprocket in chain and rotate sprocket counter-clockwise to take up all slack in driving side of chain. Line up holes in camshaft sprocket and camshaft by slipping the upper chain one tooth at a time on the transfer sprocket. Install four cap screws mounting sprocket on camshaft. Mesh automatic adjusting sprocket in chain and insert eccentric adjusting hub. Wind up spiral spring 1½ turns to provide proper tension and insert spring tongue in nearest slot in stud. Assemble plain washer on sprocket shaft and insert cotter.

**STARTER:**—Model 726-C. Starter is connected to the engine through a clutch and manual pinion shift connected to the starting switch. The direction of rotation is counter-clockwise, viewed from the commutator end. Starter cranks the engine at 200 R.P.M. Brush spring tension is 24-28 ounces.

Starter Data			
Torque	R.P.M.	Volts	Amperes
0 lb. ft.	6000	5	65
15 "	Lock	3.15	570

**Mounting:**—Starter is flange mounted on the forward side of the flywheel housing at the left of the engine. To remove starter, disconnect cable and starting pedal linkage and remove three cap screws in flange mounting. Then pull starter forward and lift from place.

**Oiling:**—Put 8 or 10 drops of light engine oil in the oiler on the commutator end of the starter every 750 miles. The drive end bearing is oilless.

**GENERATOR:**—Model 391. The direction of rotation is counter-clockwise, viewed from the commutator end. Generator current regulation is by third brush shunt field and thermostat. Thermostat contacts open at 165°F. cutting the resistance across the thermostat contacts in series with the shunt field and reducing the output approximately 50%. To adjust generator output, remove the commutator cover band and shift the third brush by hand in a counter-clockwise direction to increase the charging rate and in the opposite direction to decrease the charging rate. The third brush is held in position by friction. With standard car setting, the maximum charging rate is 22-24 amperes (cold) reached at 1400 R.P.M. or approximately 32 miles per hour.

Generator Data					
Cold Test			Hot Test		
Amperes	Volts	R.P.M.	Amperes	Volts	R.P.M.
22-24	8.2-8.62	1400	10-12	7.3-7.7	1600

Shunt field current is 1.8-2.3 amperes at 6 volts. Brush spring tension is 20-28 ounces.

**Mounting:**—Generator is mounted by special flange at right of engine on rear of accessory bracket. The water pump is driven by an extension of the generator shaft. To remove generator, disconnect water pump drive coupling and generator lead. Then remove three flange mounting cap screws and pull generator to the rear.

**Oiling:**—Put 8 or 10 drops of light engine oil in the oiler at each end of the generator every 750 miles.

**RELAY:**—Model 265-B. Relay is mounted on the generator. Relay contacts close at 600 R.P.M. or 7 M.P.H. when the generator voltage reaches 7-7.5 volts and open with a discharge current of 0-2.5 amperes. Relay contacts open .015-.020 inch. Air gap is .014-.021 inch with contacts closed.

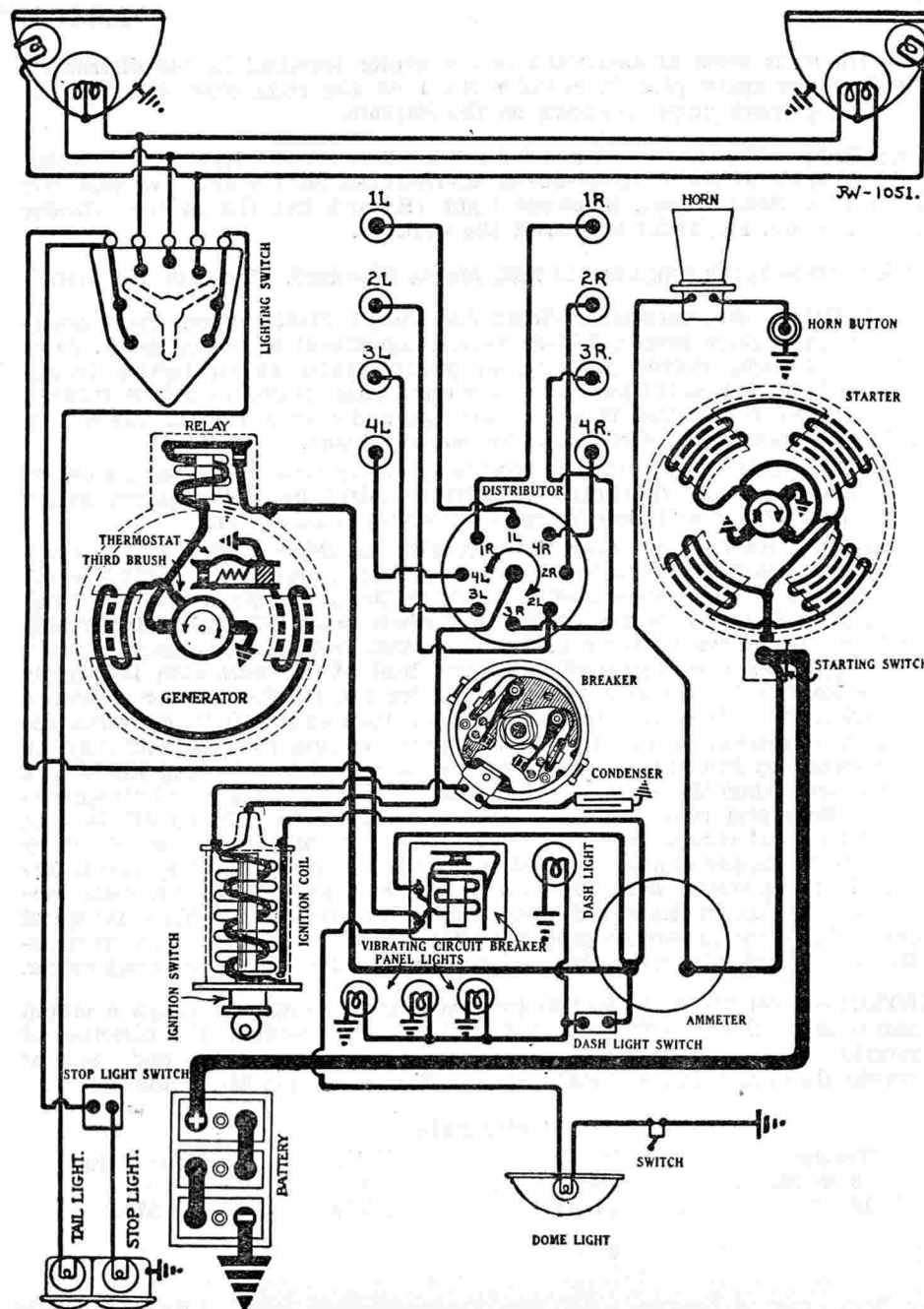
**LIGHTING:**—Delco-Remy Switch Model 486-G. Lighting switch is mounted at lower end of steering column. Headlight dimming is by resistance on switch. Headlights are 6-8 volt, 32 cp. S.C. Mazda 1133. Cowl lights are 6-8 volt, 3 cp. S.C. Mazda 63. Stop light is 6-8 volt, 15 cp. S.C. Mazda 87. Dash and tail lights are each 6-8 volt, 3 cp. S.C. Mazda 63.

**CURRENT LIMIT RELAY:**—Model 410-C. This device is a vibrating circuit breaker mounted on the dash. It is connected in the lighting circuits and begins to vibrate when the current reaches 20-30 amperes limiting the current to 2-15 amperes. Contact opening is .012-.030 inch. Air gap is .019-.025 inch.



## DELCO-REMY IGNITION

**Spark Plugs:—**Spark plugs are 18MM. Metric. Gaps are .025 inch.



# VIKING

## MODEL V-29 (1929)

### DELCO-REMY GENERATING, STARTING SYSTEM DELCO-REMY IGNITION

**STARTER:—Model 725-H.** Starter is connected to the engine through a mechanical pinion shift interconnected with the starting switch. The direction of rotation is clockwise, viewed from the commutator end. Brush spring tension is 24-28 ounces.

Starter Data			
Torque	R.P.M.	Volts	Amperes
0 lb. ft. ....	6000 .....	5 .....	60
16 " .....	Lock .....	3 .....	600

**Mounting:—**Starter is flange mounted at right of engine on forward side of flywheel housing. To remove starter, disconnect cable and starting pedal linkage and take out flange mounting cap screws. Then pull starter forward and lift from place.

**Oiling:—**Put 8 or 10 drops of light engine oil in the oiler at the commutator end of the starter every month or each 1000 miles of operation. The drive end bearing is oilless.

**GENERATOR:—Model 955-R.** The direction of rotation is counter-clockwise, viewed from the commutator end. Generator current regulation is by third brush shunt field and thermostat. Thermostat contacts open at 165°F. cutting the resistance across the thermostat contacts in series with the shunt field and reducing the output approximately 40%. To adjust generator output, loosen the small round headed screw on the generator end plate and remove the commutator cover band. Then shift the third brush in a counter-clockwise direction to increase the charging rate and in the opposite direction to decrease the charging rate. Tighten the screw after making the adjustment. With standard car setting, the maximum charging rate is 20 amperes at 8 volts reached at 1450 R.P.M.

Generator Data					
Cold Test			Hot Test		
Amperes	Volts	R.P.M.	Amperes	Volts	R.P.M.
19-21 .....	8.35-8.5 .....	1450	9-12 .....	7.35-7.65 .....	1800-2000

Generator motoring draws 5.5 amperes at 6 volts. Shunt field current is 4-6.1 amperes at 6 volts. Brush spring tension is 14-18 ounces.

**Mounting:—**Generator is mounted at left of engine on special swinging bracket and is driven by the fan belt. To remove generator, disconnect lead and remove clamp bolt in adjustment arm. Then swing generator toward engine and slip off drive belt. Remove two bolts under generator and lift generator from place.

**Oiling:—**Put 8 or 10 drops of light engine oil in the oiler at each end of the generator every month or each 1000 miles.

**RELAY:—Model 265-G.** Relay is mounted on the generator. Relay closes when the voltage of the generator reaches 7-7.5 volts and open with a discharge current of 0-2.5 amperes. Relay contact gap is .015-.025 inch. Air gap is .014-.020 inch with contacts closed.

**LIGHTING:—Switch Model 486-B.** Lighting switch is mounted at lower end of steering column. Double filament headlights using a second 21 cp. filament instead of dimmers are standard equipment. Headlights are 6-8 volt, 21-21 cp. D.C. Mazda 1110. Parking lights in headlights are 6-8 volt, 3 cp. S.C. Mazda 63. Stop light is 6-8 volt, 15 cp. S.C. Mazda 87. Dash, dome and tail lights are each 6-8 volt, 3 cp. S.C. Mazda 63.

**CURRENT LIMIT RELAY:—Model 410-C.** This device is a vibrating circuit breaker mounted on the dash and connected in the lighting circuits. It begins to vibrate when the current reaches 25-30 amperes and continues limiting the current to 10-15 amperes. Circuit breaker contact gap is .012-.030 inch. Air gap is .019-.025 inch with contacts closed.

# WHIPPET

## MODEL 96-A (1929)

### AUTO-LITE GENERATING, STARTING SYSTEM AUTO-LITE IGNITION

**BATTERY:**—U.S.L. Type 3-CVX-5X6, 6 volt. The negative (—) terminal is grounded. Starting capacity (20 minute rate) is 96 amperes for 20 minutes. Lighting capacity (5 ampere rate) is 5 amperes for 17 hours. Battery is mounted on left frame member.

**IGNITION:**—Coil Model IG-4065. Coil is mounted on the right side of the engine block. Ignition current is 1-3 amperes at 6 volts with engine running and 3.4-5 amperes at 6 volts with engine stopped.

**Distributor Model IGB-4020-A.** Breaker contacts separate .020-.025 inch. Set contact gap by loosening lock nut on stationary contact mounting stud and turning up stud until correct gap is secured with breaker arm on lobe of cam. Resurface contacts when necessary with a fine flat contact file or on a medium hard oilstone. Breaker arm spring tension is 16-20 ounces. Distributor is semi-automatic. Maximum manual advance is 20 degrees (engine). Automatic advance begins at 600 R.P.M. of engine. Maximum automatic advance is 22 degrees reached at 3400 R.P.M.

**Mounting:**—An Electrolock Ignition Switch is standard equipment. The Electrolock must be disconnected at the dash and removed with the distributor as a unit whenever the distributor is taken off the car. The Electrolock can then be disconnected from the distributor by taking off the nut on the terminal stud inside the distributor case and pulling the cable ferrule and stud out of the distributor. Distributor is mounted on the rear of the generator at the right of the engine. To remove distributor, disconnect Electrolock at dash, disconnect manual spark control and remove distributor head with cables intact. Then take out hold-down screw in advance arm and lift distributor from place.

**Oiling:**—Put 5 to 8 drops of light engine oil in the oiler on the side of the distributor every two weeks or each 500 miles. Every 5000 miles put one drop of oil on the breaker arm pivot pin and put a small bit of vaseline on the face of the breaker cam.

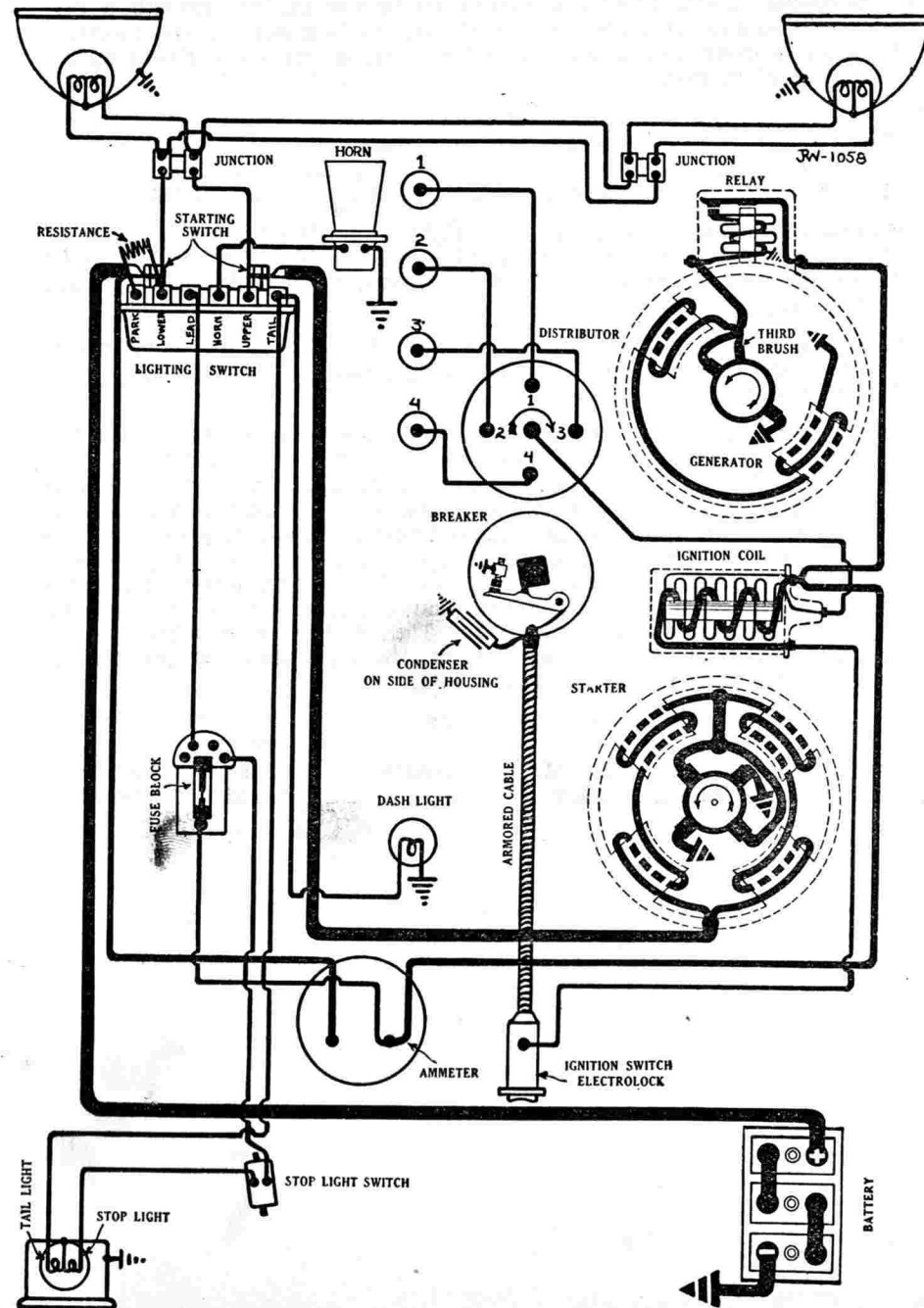
**Timing:**—Breaker contacts begin to separate when the piston entering power stroke reaches top dead center with the manual spark control in the fully advanced position. To set timing, crank engine over until piston No. 1 enters compression stroke (the up stroke with both valves closed). Fully advance spark control and continue to crank engine until the top dead center mark on the flywheel is opposite the indicator mark in the flywheel case. Loosen advance arm clamp screw and rotate distributor until the contacts begin to open. Tighten the clamp screw and connect the segment opposite the rotor to the spark plug in cylinder No. 1. Connect the remaining spark plugs in order 3-4-2 clockwise around the distributor head.

**Firing Order:**—The firing order is 1-3-4-2.

**Spark Plugs:**—Spark plugs are  $\frac{7}{8}$ -18 S.A.E. Standard Champion No. 4. Gaps are .025 inch.

**VALVE TIMING:**—**INLET VALVES:**—Head diameter, 1  $\frac{15}{32}$  inches. Stem diameter,  $\frac{11}{32}$  inch. Stem length, 5  $\frac{1}{2}$  inches. Valve lift,  $\frac{5}{16}$  inch. Spring pressure, 48 pounds. Tappet clearance, .004 inch. Inlet valves open 7 degrees after top dead center and close 39 degrees after lower dead center.

**EXHAUST VALVES:**—Head diameter, 1  $\frac{1}{16}$  inches. Stem diameter,  $\frac{11}{32}$  inch. Stem length, 5  $\frac{1}{2}$  inches. Valve lift,  $\frac{5}{16}$  inch. Spring pressure, 48 pounds. Tappet clearance, .006 inch. Exhaust valves open 38 degrees before lower dead center and close 2 degrees before top dead center. Valve stem guides are removable. Valves with oversize stems are not made.





# WHIPPET

## MODEL 96-A (1929)

### AUTO-LITE GENERATING, STARTING SYSTEM AUTO-LITE IGNITION

**STARTER:—Model MZ-4001.** Starter is connected to the engine through a Bendix drive. The direction of rotation is counter-clockwise, viewed from the commutator end. Brush spring tension is 2½-3 pounds. Starter cranks the engine at 130 R.P.M.

Starter Data			
Torque	R.P.M.	Volts	Amperes
0 lb. ft.	Free	6	50
1.5 "	1800	5.2	150
2.5 "	1325	5.0	200
5.0 "	740	4.5	300
7.6 "	220	4.0	400
12.2 "	Lock	4.0	550

**Mounting:—**Starter is flange mounted at right of engine on forward side of rear motor support. To remove starter, disconnect cable and remove three flange mounting cap screws. Then pull starter forward to clear Bendix drive and lift from place.

**Oiling:—**Starter bearings are oilless. They require no attention.

**GENERATOR:—Model GAL-4116.** The direction of rotation is counter-clockwise, viewed from the commutator end. Generator current regulation is by third brush shunt field. To adjust generator output, remove the commutator cover band and shift the third brush by tapping on the brush mounting stud with a screw driver. Shift the third brush in a counter-clockwise direction to increase the charging rate and in the opposite direction to decrease the charging rate. The brush is held in position by friction between the mounting stud and the end plate. With standard car setting the maximum charging rate is 17 amperes at 8 volts reached at 2075 R.P.M.

Generator Data		
Amperes	Volts	R.P.M.
2	6.4	675
6	6.9	835
10	7.3	1025
14	7.65	1275
17.2	8.0	2075
14	7.65	2925

Brush spring tension is 24-32 ounces. Motoring, generator draws 4.7-5.7 amperes at 6 volts. Shunt field current is 4.2 amperes at 6 volts.

**Mounting:—**Generator is mounted at right of engine on rear of timing chain case. To remove generator, disconnect all ignition wiring or remove distributor. Then take off cover plate over chain case, remove nut on generator sprocket, pull sprocket. Then remove clamp band on generator, pull generator to the rear and lift from place. Tie up the timing chain and do not attempt to crank the engine with the generator out.

**Oiling:—**Put 4 or 5 drops of light engine oil in the oiler at each end of the generator every two weeks or each 500 miles.

**RELAY:—Model 4014.** Relay is mounted on the generator. Relay closes at 675 R.P.M. when the voltage of the generator reaches 7-7.5 volts and opens with a discharge current of 0-2.5 amperes. Charging current at closing of contacts is approximately 2 amperes. Relay contacts separate .025-.035 inch. Air gap is .010-.030 inch with contacts closed.

**LIGHTING:—Aid Switch Model 311.** The switch is of the 'Finger Tip' control type and is mounted on the lower end of the steering column. The starting switch, horn button, and lighting switch are combined in one unit as shown in the diagram. Headlights are 'Twi-lite' double filament using the second 21 cp. filament instead of dimmers. A parking resistance is mounted on the switch which dims the upper filament of the headlight bulbs for use as a parking light. The tail light and stop light are combined in one double filament bulb. Headlights are 6-8 volt, 21-21 cp. D.C. Mazda 1110. Dash and dome lights are each 6-8 volt, 3 cp. S.C. Mazda 63. Tail and stop light is 6-8 volt, 3-21 cp. D.C. Mazda 1158.

**FUSES:—**Lighting fuse mounted on fuse block on the dash is 20 ampere capacity.

# WHIPPET

## MODEL 98-A (1929)

### AUTO-LITE GENERATING, STARTING SYSTEM AUTO-LITE IGNITION

**BATTERY:**—U.S.L. Type 3 CVX-6X-6A, 6 volt. The negative (—) terminal is grounded. Starting capacity (20 minute rate) is 115 amperes for 20 minutes. Lighting capacity (5 ampere rate) is 5 amperes for 21 hours. Battery is mounted on the left frame member.

**IGNITION:**—Coil Model IG-4065. Coil is mounted on the right side of the engine block. Ignition current is 1.5-3 amperes at 6 volts with engine running and 3.4-5 amperes at 6 volts with engine stopped.

**Distributor Model IGB-4021.** Breaker contacts separate .020-.025 inch. Set contact gap by loosening lock nut on stationary contact mounting stud and turning up stud until correct gap is secured with breaker arm on lobe of cam. Resurface contacts when necessary with a fine flat contact file or on a medium hard oilstone. Breaker arm spring tension is 16-20 ounces. Distributor is semi-automatic. Maximum manual advance is 20 degrees (engine). Automatic advance begins at 600 R.P.M. of engine. Maximum automatic advance is 24 degrees reached at 3400 R.P.M. of engine.

**Mounting:**—An Electrolock Ignition Switch is standard equipment. The Electrolock must be disconnected at the dash and removed with the distributor as a unit whenever the distributor is taken off the car. The Electrolock can then be disconnected by taking off the nut on the terminal stud inside the distributor case and pulling the cable ferrule and stud out of the distributor. Distributor is mounted on the rear of the generator at the right of the engine. To remove distributor, disconnect Electrolock at dash, disconnect manual spark control and remove distributor head with cables intact. Then take out hold-down screw in advance arm and lift distributor from place.

**Oiling:**—Put 5 to 8 drops of light engine oil in the oiler on the side of the distributor every two weeks or each 500 miles. Every 5000 miles put one drop of oil on the breaker arm pivot pin and put a small bit of vaseline on the face of the breaker cam.

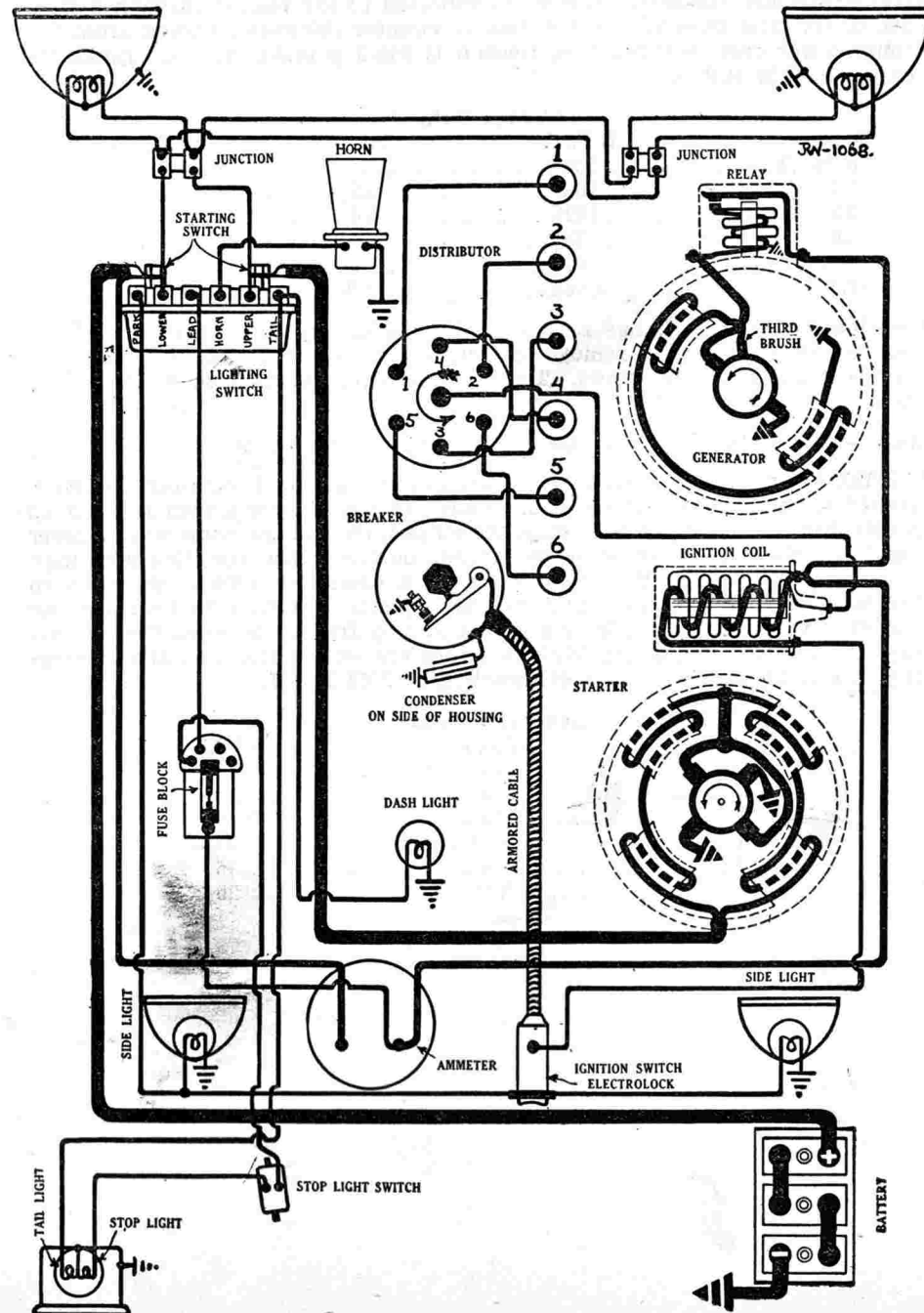
**Timing:**—Breaker contacts begin to separate when the piston entering power stroke reaches top dead center with the manual spark control in the fully advanced position. To set timing, crank engine over until piston No. 1 enters compression stroke (the up stroke with both valves closed). Place the manual spark control button in the fully advanced position. Continue to crank engine until piston reaches top dead center when the top dead center mark on the flywheel will be directly opposite the indicator on the flywheel case. Loosen advance arm clamp screw and rotate the distributor until contacts begin to open. Tighten the clamp screw and connect the segment opposite the rotor to the spark plug in cylinder No. 1. Connect the remaining spark plugs in order 5-3-6-2-4 clockwise around the distributor head.

**Firing Order:**—The firing order is 1-5-3-6-2-4.

**Spark Plugs:**—Spark plugs are  $\frac{7}{8}$ -18 S.A.E. Standard Champion No. 3. Gaps are .025 inch.

**VALVE TIMING:**—**INLET VALVES:**—Tappet clearance, .004 inch. Inlet valves open 7 degrees after top dead center and close 39 degrees after lower dead center.

**EXHAUST VALVES:**—Tappet clearance, .006 inch. Exhaust valves open 38 degrees before lower dead center and close 2 degrees before top dead center.



# WHIPPET

## MODEL 98-A (1929)

### AUTO-LITE GENERATING, STARTING SYSTEM AUTO-LITE IGNITION

**STARTER:—Model MZ-4011.** Starter is connected to the engine through an in-board Bendix drive. The direction of rotation is counter-clockwise, viewed from the commutator end. Brush spring tension is 2½-3 pounds. Starter cranks the engine at 140 R.P.M.

Starter Data			
Torque	R.P.M.	Volts	Amperes
0 lb. ft.	Free	6	
1.5 "	1800	5.2	150
2.5 "	1325	5.0	200
5.0 "	740	4.5	300
7.6 "	220	4.0	400
12.2 "	Lock	4.0	550

**Mounting:—**Starter is flange mounted on rear engine support at right of engine. To remove starter, disconnect cable and remove 3 flange mounting cap screws. Then pull starter forward and lift from place.

**Oiling:—**Starter bearings are oilless. They require no attention.

**GENERATOR:—Model GAL-4106.** The direction of rotation is counter-clockwise, viewed from the commutator end. Generator current regulation is by third brush shunt field. To adjust generator output, remove commutator cover band and shift third brush by tapping on third brush mounting bracket. Shift the third brush in a counter-clockwise direction to increase the charging rate and in the opposite direction to decrease the charging rate. The third brush is held in any position by friction between the mounting bracket and the end plate. The maximum charging rate is 17 amperes at 8 volts reached at 2025 R.P.M.

Generator Data		
Amperes	Volts	R.P.M.
2	6.4	675
6	6.9	835
10	7.3	1025
14	7.65	1275
17.2	8.0	2075
14	7.65	2925

Generator brush spring tension is 24-32 ounces. Generator motoring draws 4.7-5.7 amperes at 6 volts. Shunt field current is 4.2 amperes at 6 volts.

**Mounting:—**Generator is mounted at right of engine on rear of timing chain case. To remove generator, disconnect all ignition wiring or remove distributor. Then take off inspection cover on chain case, remove nut on generator sprocket, pull sprocket. Then remove clamp band on generator, pull generator to rear and lift from place leaving the drive sprocket in the engine. Tie up the timing chain and do not attempt to crank engine with generator out.

**Oiling:—**Put 4 or 5 drops of light engine oil in the oiler at each end of the generator every 500 miles.

**RELAY:—Model CB-4014.** Relay is mounted on the generator. Relay closes at 675 R.P.M. when the generator voltage reaches 7-7.5 volts and opens with a discharge current of 0-2.5 amperes. Charging current at closing of contacts is approximately 2 amperes. Relay contacts separate .025-.035 inch. Air gap is .010-.030 inch with contacts closed.

**LIGHTING:—Aid Switch Model 311.** Switch is of 'Finger Tip Control' type and is mounted at the base of the steering column. The starting switch, horn button and lighting switch are combined in the one unit. Headlights are 'Twi-lite' double filament using the second 21 cp. filament instead of dimmers. The tail light and stop light are special double filament bulb. Headlights are 6-8 volt, 21-21 cp. D.C. Mazda 1110. Side lights are 6-8 volt, 3 cp. S.C. Mazda 63. Dash and dome lights are each 6-8 volt, 3 cp. S.C. Mazda 63. Stop and tail lights are 6-8 volt, 21-3 cp. D.C. Mazda 1158.

**FUSES:—**Lighting fuse on fuse block on dash is 20 ampere capacity.



# WILLYS KNIGHT

## MODEL 70-B (1929)

### AUTO-LITE GENERATING, STARTING SYSTEM AUTO-LITE IGNITION

**BATTERY:**—U.S.L. Type 3-HVX-6X-6, 6 volt. The negative (—) terminal is grounded. Starting capacity (20 minute rate) is 127 amperes for 20 minutes. Lighting capacity (5 ampere rate) is 5 amperes for 23 hours. Battery is mounted on left frame member under the front floor boards.

**IGNITION:**—Coil Model IG-4065. Coil is mounted on right side of engine block. Ignition current is 1-3 amperes at 6 volts with engine running and 3.4-5 amperes at 6 volts with engine stopped.

**Distributor Model IGC-4004.** Breaker contacts separate .020-.025 inch. Set contact gap by loosening lock nut on stationary contact stud and turning up stud until proper gap is secured with breaker arm on lobe of cam. Re-surface contacts with a fine flat contact file or on a medium hard oilstone. Breaker arm spring tension is 16-20 ounces. Distributor is semi-automatic. Maximum manual advance is 20 degrees (engine). Automatic advance begins at 800 R.P.M. of engine. Maximum automatic advance is 20 degrees reached at 2350 R.P.M.

**Mounting:**—Distributor is mounted on the right of the engine. To remove distributor, disconnect manual advance rod and remove Electrolock from instrument board. Then remove distributor head with cables intact and remove two mounting cap screws in distributor base. Lift distributor from place and remove Electrolock and distributor as a unit.

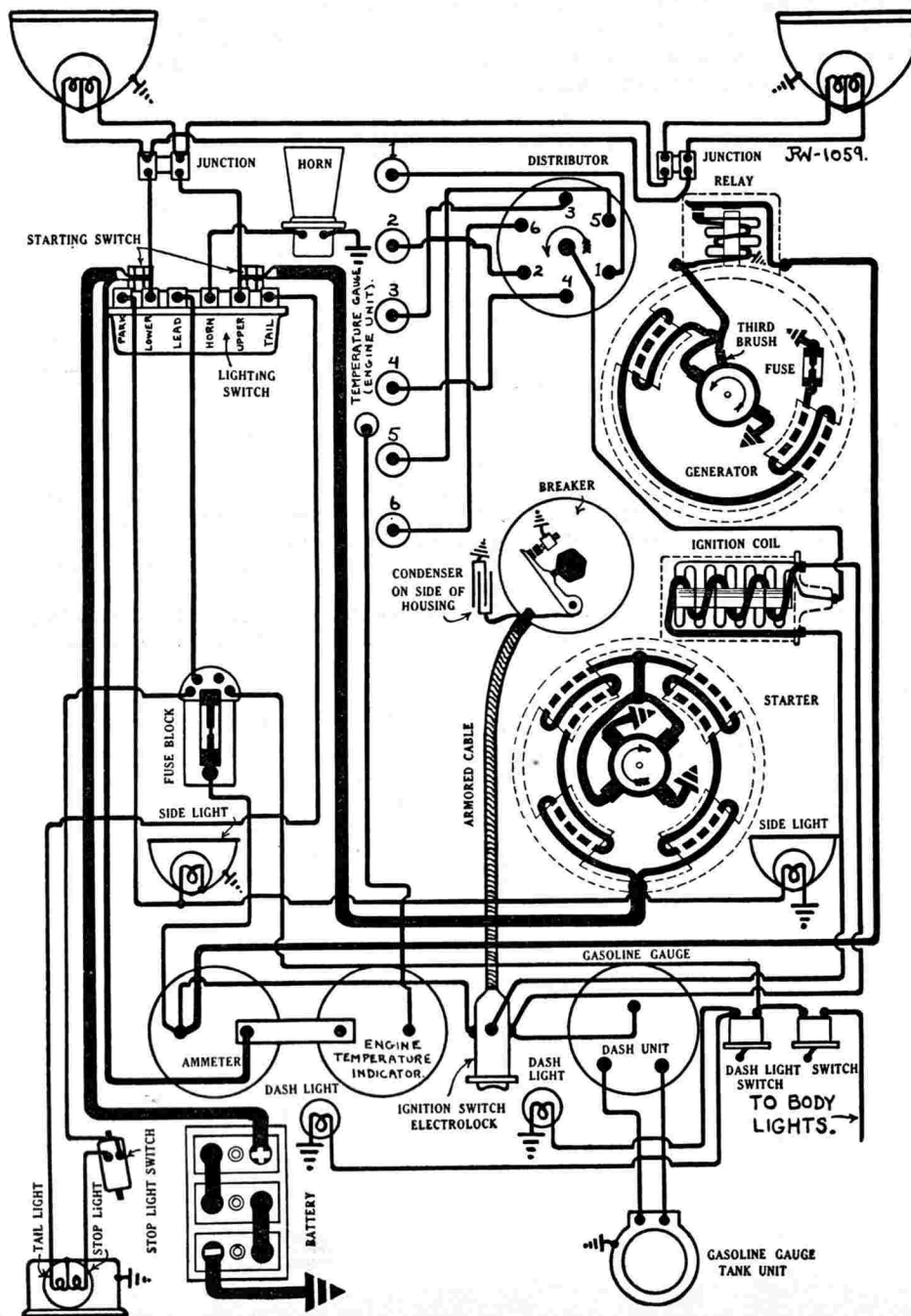
**Oiling:**—Fill the grease cup on the side of the distributor shaft with pure vaseline and turn down one turn each week or each 250 miles. Every 5000 miles remove the rotor button and saturate the wick oiler in the center of the shaft with light engine oil. Put a small bit of vaseline on the face of the breaker cam under the fiber bumper of the contact arm.

**Timing:**—Breaker contacts begin to separate when the piston entering power stroke reaches a position 8 degrees on the flywheel before top dead center with the manual spark control in the fully advanced position. To check timing, crank engine until piston No. 1 enters compression stroke. This may be checked by removing spark plugs in the other cylinders and cranking the engine until compression is felt. Then fully advance manual spark lever and continue to crank engine until ignition mark on the flywheel is opposite the indicator in the clutch inspection hole. This mark is 8 degrees or 51/64 inch before top dead center. At this point the piston will be .026 inch before top dead center and the contacts should separate. To set timing, loosen the clamp screw under the distributor cup and rotate the distributor until contacts begin to separate. Tighten the clamp screw. A variation of 1 degree or 1/8 inch is allowable in setting the ignition.

**Firing Order:**—The firing order is 1-5-3-6-2-4.

**Spark Plugs:**—Spark plugs are 7/8-18 S.A.E. Standard Champion No. 1. Gaps are .025 inch.

**VALVE TIMING:**—The Willys Knight engine is of the sleeve valve type. To time sleeve valves with eccentric shaft sprocket removed, remove pipe plug in exhaust manifold opposite No. 6 cylinder and scrape carbon from edges of sleeve ports so that closing of ports can be checked. Then remove clutch inspection plate and crank engine until flywheel mark 'EC' is opposite the pointer on the flywheel case. Place electric lamp over spark plug port in cylinder No. 6 and rotate eccentric shaft in a clockwise direction until the upper edge of the port in the outside sleeve passes the lower edge of the port in the cylinder block on the downward stroke. At this point the ray of



# WILLYS KNIGHT

## MODEL 70-B (1929)

### AUTO-LITE GENERATING, STARTING SYSTEM

### AUTO-LITE IGNITION

light from the lamp will be cut off. Then assemble chain on crankshaft, idler and generator sprockets. Insert the eccentric shaft sprocket in chain and change mesh of sprocket in chain one tooth at a time until the five cap screws can be inserted without changing the position of the eccentric shaft or crankshaft. Then tighten the five cap screws holding the sprocket rigidly on the shaft. To set tension of timing chain, turn idler eccentric bushing spring until all slackness is removed from chain. Then give spring one complete turn and insert end in slot of idler stud.

**STARTER:—MAB-4014.** Starter is connected to the engine through a Bendix drive. The direction of rotation is clockwise, viewed from the commutator end. Starter cranks the engine at 140 R.P.M. drawing 250 amperes at 5 volts. Starter switch is Model SW-4001. Brush spring tension is 1¾-2¼ pounds.

Starter Data			
Torque	R.P.M.	Volts	Amperes
.6 lb. ft.	1900		100
3.5 "	1100		200
6.6 "	700		300
10.2 "	410		400
24 "	Lock	4	725

**Mounting:—**Starter is barrel mounted at the right of the transmission case on the rear of the flywheel housing. To remove, disconnect cable and remove pilot mounting screw directly above starter sleeve. Then slide starter to rear and lift from place.

**Oiling:—**Put 7 or 8 drops of light engine oil in the oiler on the drive end of the starter every two weeks or each 500 miles.

**GENERATOR:—Model GAL-4103.** The direction of rotation is counter-clockwise, viewed from the commutator end. Generator current regulation is by third brush shunt field. To adjust generator output, remove the commutator cover band and shift the third brush and mounting plate by tapping on the third brush mounting stud with a screwdriver. Shift the third brush in a counter-clockwise direction to increase the charging rate and in the opposite direction to decrease the charging rate. The mounting plate is held in any position by friction between the mounting stud and the end plate. The maximum charging rate is 17 amperes at 8 volts reached at 2075 R.P.M. or 23 miles per hour.

#### Generator Data

Amperes	Volts	R.P.M.
2	6.4	675
6	6.9	835
10	7.3	1025
14	7.65	1275
17.2	8.0	2075
14	7.65	2925

Brush spring tension is 24-32 ounces. Generator motoring draws 4.7-5.7 amperes at 6 volts. Shunt field current is 4.2 amperes at 6 volts. A five ampere field fuse is mounted on the top of the generator.

**Mounting:—**Generator is cradle mounted on the right side of the engine. To remove generator, disconnect lead and loosen two nuts on mounting strap. Then disengage coupling and lift generator from place.

**Oiling:—**Put 7 or 8 drops of light engine oil in each of the generator oilers every week or each 250 miles.

**RELAY:—Model CB-4014.** Relay is mounted on the generator. Relay closes at 750 R.P.M. or 5.5-6 M.P.H. when the generator voltage reaches 7-7.5 volts and opens with a discharge current of 0-2.5 amperes. Charging current at closing of contacts is approximately 2 amperes. Relay contacts open .025-.035 inch. Air gap between relay armature and coil core is .010-.030 inch with contacts closed.

**LIGHTING:—Aid Lighting Switch Model 311.** Lighting switch is of 'Finger Tip Control' type and is mounted at the base of the steering column. The starting switch, horn button and lighting switch are combined in the one unit. Headlights are 'Twi-lite' type with double filament bulbs using the second 21 cp. filament instead of dimmers. The tail and stop lights are one unit using a special double filament bulb. Headlights are 6-8 volt, 21-21 cp. D.C. Mazda 1110. Side lights are 6-8 volt, 3 cp. S.C. Mazda 63. Stop and tail lights are 6-8 volt, 21-3 cp. D.C. Mazda 1158. Dash and dome lights are 6-8 volt, 3 cp. S.C. Mazda 63.

**FUSES:—**Generator field fuse is 5 ampere capacity. Lighting fuse mounted on fuse block on dash is 20 ampere capacity.

# WINDSOR

## MODEL 6-69 (1929)

### AUTO-LITE GENERATING, STARTING SYSTEM AUTO-LITE IGNITION

**BATTERY:**—U.S.L. Type XY-13X, 6 volt. The negative (—) terminal is grounded. Starting capacity (20 minute rate) is 86 amperes for 20 minutes. Lighting capacity (5 ampere rate) is 5 amperes for 17 hours. Battery is mounted under the left front seat.

**IGNITION:**—Coil Model IG-4066. Coil is mounted on the generator at the right of the engine. Ignition current is 1.5 amperes at 6 volts with engine running and 4.5 amperes at 6 volts with engine stopped.

**Distributor Model IGB-4006.** Breaker contacts separate .020-.024 inch. Set contact gap by loosening lock nut on stationary contact stud and turning up stud until correct gap is secured with breaker arm on lobe of cam. Re-surface contacts when necessary with a fine flat contact file or on a medium hard oilstone. Breaker arm spring tension is 16-20 ounces. Distributor is of the full automatic type.

**Mounting:**—Distributor is mounted on commutator end of generator at right of engine. To remove distributor, disconnect primary lead and remove distributor head with cables intact. Then remove clamp screw and lift distributor from place.

**Oiling:**—Put 8 or 10 drops of light engine oil in the oiler on the side of the distributor housing every two weeks or each 500 miles. Every 1000 miles remove the distributor head and rotor and put a small amount of vaseline on the face of the breaker cam. Every six months refill the gear compartment with medium cup grease.

**Timing:**—Breaker contacts begin to separate when the piston entering power stroke reaches top dead center. To set timing, crank engine over until piston No. 1 enters compression stroke (the upstroke with both valves closed). Make certain that breaker assembly is in the fully retarded position and continue to crank engine until piston reaches top dead center when the flywheel mark 'DC' will be opposite the indicator in the flywheel housing. Then loosen clamp screw and rotate distributor until contacts begin to open. Tighten the clamp screw and connect the segment opposite the rotor to the spark plug in cylinder No. 1. Connect the remaining spark plugs in order 5-3-6-2-4 clockwise around the distributor head.

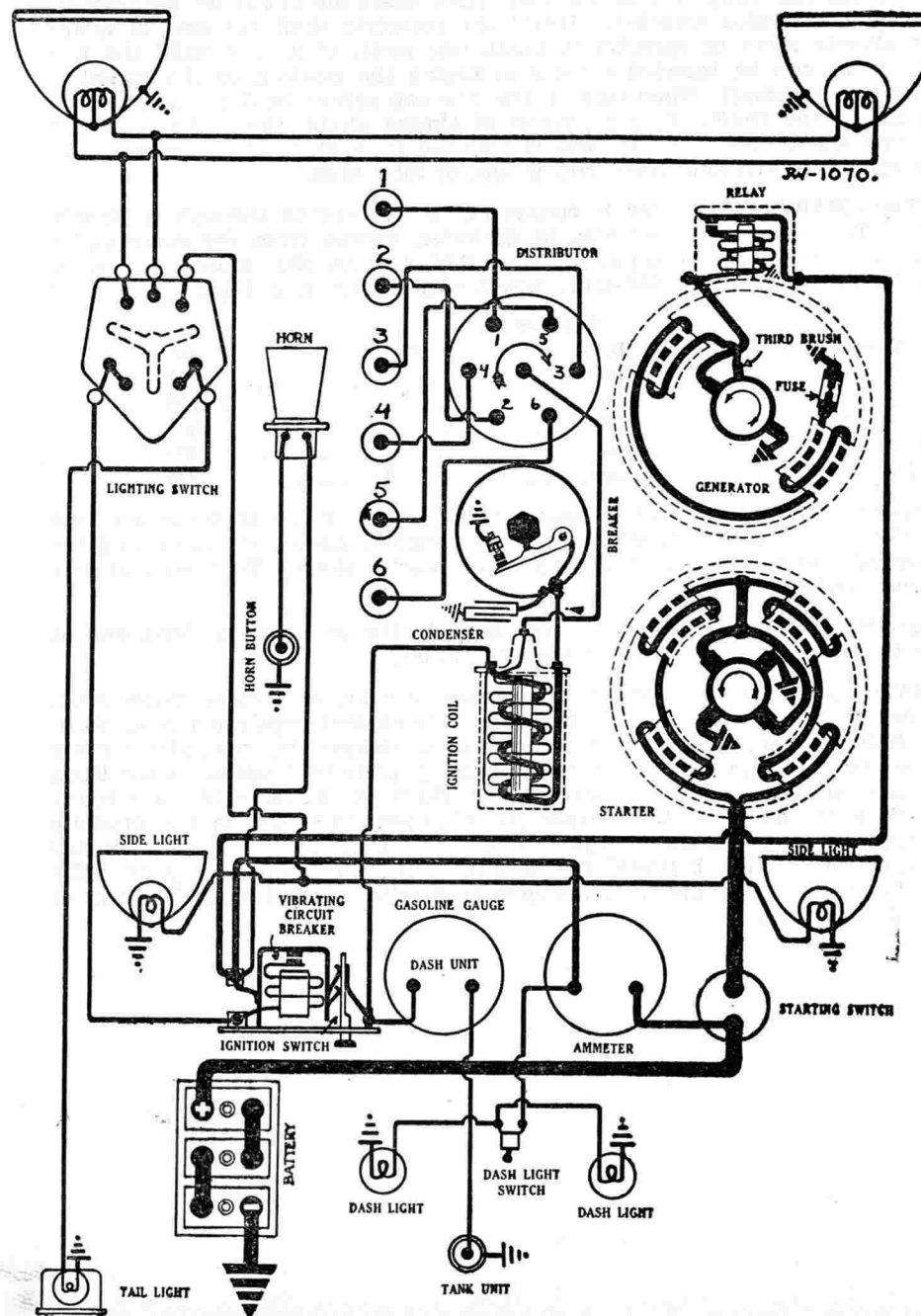
**Firing Order:**—The firing order is 1-5-3-6-2-4.

**Spark Plugs:**—Spark plugs are  $\frac{3}{8}$ -18 S.A.E. Standard. Gaps are .025 inch.

**VALVE TIMING:**—**INLET VALVES:**—Head diameter, 1  $\frac{17}{16}$  inches. Stem diameter, .371 inch. Stem length, 5  $\frac{5}{32}$  inches. Valve lift,  $\frac{5}{16}$  inch. Spring pressure, 77 $\frac{1}{2}$  pounds compressed to 2 inches. Tappet clearance, .006 inch (hot). Inlet valves open 4 degrees after top dead center and close 46 degrees after lower dead center.

**EXHAUST VALVES:**—Head diameter, 1  $\frac{5}{16}$  inches. Stem diameter, .371 inch. Stem length, 5  $\frac{5}{32}$  inches. Valve lift,  $\frac{5}{16}$  inch. Spring pressure, 77 $\frac{1}{2}$  pounds compressed to 2 inches. Tappet clearance, .008 inch (hot). Exhaust valves open 41 degrees before lower dead center and close 1 degree after top dead center. Valve stem guides are removable. Oversize valves are made.

**STARTER:**—Model MAD-4104. Starter is connected to the engine through a Bendix drive. The direction of rotation is counter-clockwise, viewed from the commutator end. Brush spring tension is 13 $\frac{3}{4}$ -2 $\frac{1}{2}$  pounds each.





# WINDSOR

## MODEL 6-69 (1929)

### AUTO-LITE GENERATING, STARTING SYSTEM AUTO-LITE IGNITION

#### Starter Data

Torque	R.P.M.	Volts	Amperes
.3 lb. ft.	2750	5.5	100
2.8 "	1360	5.0	200
5.7 "	800	4.5	300
8.7 "	400	4.0	400
15.2 "	Lock	3.6	760

**Mounting:**—Starter is mounted in front of the flywheel on the right side of the engine. Mounting is by a No. 1 S.A.E. flange mounting. To remove starter, disconnect starter cable and remove three flange mounting bolts. Then slide starter forward and lift from place.

**Oiling:**—Starter bearings are oilless. They require no attention.

**GENERATOR:**—Model GAL-4104. The direction of rotation is counter-clockwise, viewed from the commutator end. Generator current regulation is by third brush shunt field. To adjust generator output, loosen the commutator cover band and shift the third brush by tapping on the brush mounting stud with a screwdriver. Shift the third brush in a counter-clockwise direction to increase the charging rate and in the opposite direction to decrease the charging rate. The third brush is held in position by friction between the mounting stud and the end plate.

#### Generator Data

Amperes	Volts	R.P.M.
2	6.4	675
6	6.9	835
10	7.3	1025
14	7.65	1275
17.2	8.0	2075
14	7.65	2925

Brush spring tension is 24-32 ounces. Motoring, generator draws 4.7-5.7 amperes at 6 volts. Shunt field current is 4.2 amperes at 6 volts.

**Mounting:**—Generator is mounted at the right of the engine to the rear of the chain case. To remove generator, disconnect generator lead and ignition leads and remove distributor head. Remove oil-filler, thus exposing front side of chain case and remove nut holding sprocket on generator shaft. Then loosen clamp adjusting screw on flange and remove two flange mounting screws. Then slide generator to rear and lift from place.

**Oiling:**—Put 8 or 10 drops of light engine oil in the oiler on the commutator end of the generator every month or each 1000 miles. The drive end is oiled by the oil spray from the chain case.

**RELAY:**—Relay is mounted on the generator. Relay contacts close at 675 R.P.M. when the voltage of the generator reaches 6.4 volts and open with a discharge current of 0-2.5 amperes. Relay contacts separate .025-.035 inch. Air gap is .010-.030 inch with contacts closed. Charging current at closing of contacts is approximately 2 amperes.

**LIGHTING:**—Delco-Remy Switch Model 1303. Lighting switch is mounted at lower end of steering column. Headlights are double filament using the second 21 cp. filament instead of dimmers. Headlights are 6-8 volt, 21-21 cp. D.C. Mazda 1110. Side, dash, dome and tail lights are each 6-8 volt, 3 cp. S.C. Mazda 63.

**CIRCUIT BREAKER:**—A vibrating circuit breaker is mounted on the back of the ignition switch. It protects the head, side and tail lamp circuits. A current of 25-30 amperes will cause this device to operate, limiting the current to 10-15 amperes.

**ACCESSORIES:**—A National Electric gasoline gauge is mounted on the dash.

# WINDSOR

## MODEL 6-77 (1929)

### DELCO-REMY GENERATING, STARTING SYSTEM DELCO-REMY IGNITION

**BATTERY:**—U.S.L. Type XY-15X-6, 6 volt. The negative (—) terminal is grounded. Starting capacity (20 minute rate) is 119 amperes for 20 minutes. Lighting capacity (5 ampere rate) is 5 amperes for 21 hours. Battery is mounted under the left front seat.

**IGNITION:**—Coil Model 526-W. Coil is mounted on the back of the dash with the ignition switch extending through to the face of the instrument panel. The ignition switch is built into the base of the coil. Ignition current is 2 amperes at 6 volts with engine running and 5 amperes at 6 volts with engine stopped.

**Distributor Model 640F.** Breaker contacts separate .018-.024 inch. Adjust contact by loosening lock screw on stationary contact mounting plate and turning eccentric adjusting screw directly behind breaker arm until proper gap is secured. Tighten the lock screw. Resurface contacts with a fine contact file or on a medium hard oilstone. Breaker arm spring tension is 17-21 ounces. Distributor is semi-automatic. Maximum manual advance is 20 degrees (engine). Automatic advance begins at 500 R.P.M. of engine. Maximum automatic advance is 30 degrees reached at 3200 R.P.M.

**Mounting:**—Distributor is mounted on the cylinder head. To remove distributor, disconnect primary lead and manual advance rod and remove head with cables intact. Then loosen clamp screw and lift distributor from place.

**Oiling:**—Fill the grease cup on the side of the distributor shaft with medium heavy grease and turn down one turn every 500 miles. Every month put a small bit of vaseline on the face of the breaker cam.

**Timing:**—Breaker contacts begin to separate when the piston entering power stroke reaches top dead center with the manual advance lever fully retarded. To set timing, crank engine until piston No. 6 enters compression stroke (the upstroke with both valves closed). Fully retard spark lever. Then continue to crank engine until piston No. 6 reaches top dead center when the flywheel mark 'IGN' will be opposite the indicator on the flywheel housing. Loosen clamp screw and rotate distributor until contacts begin to separate. Connect the segment opposite the rotor button with the spark plug in cylinder No. 6 and connect the remaining plugs in order 2-4-1-5-3 counter-clockwise around the distributor head.

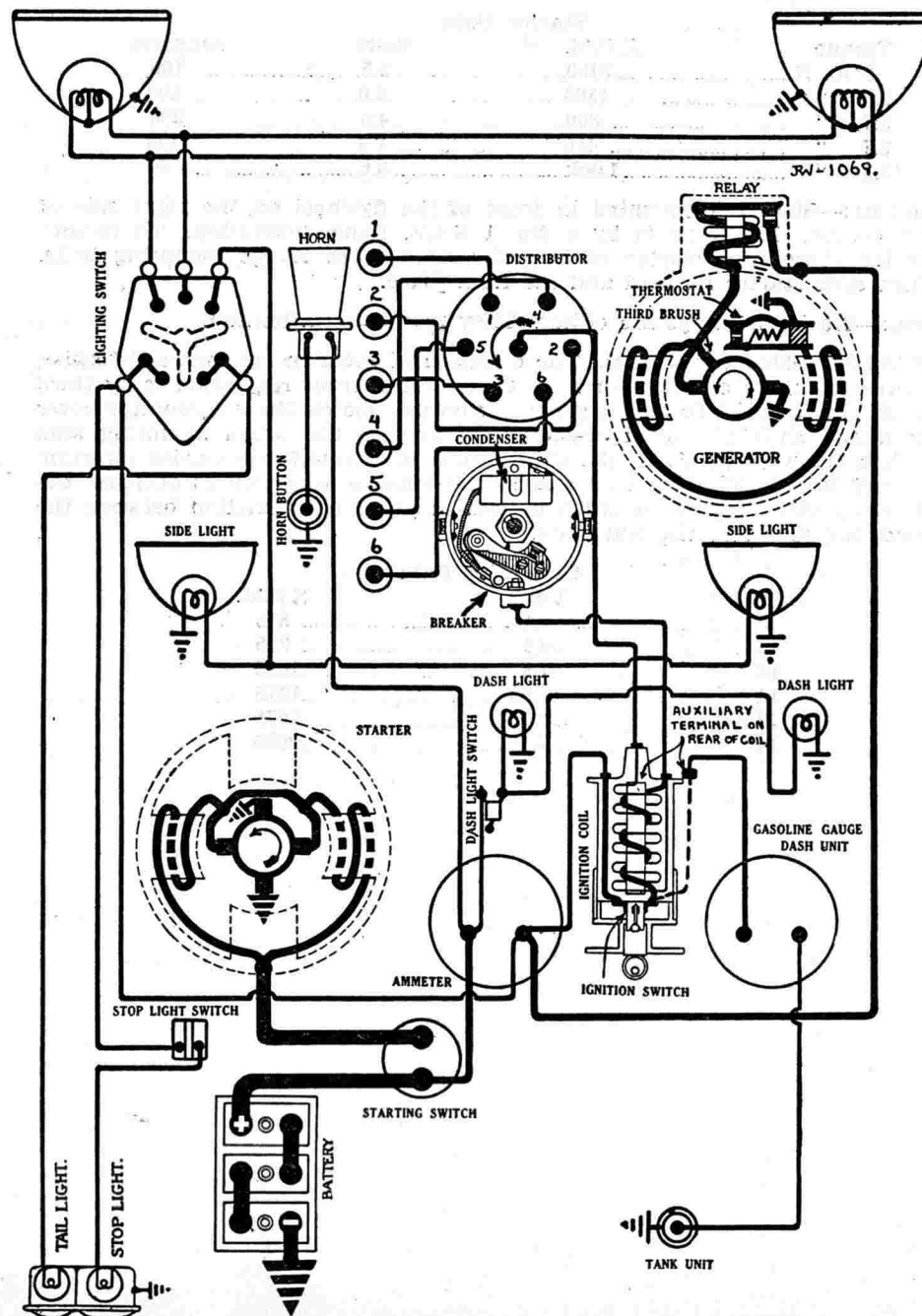
**Firing Order:**—The firing order is 1-5-3-6-2-4.

**Spark Plugs:**—Spark plugs are  $\frac{7}{8}$ -18 S.A.E. Standard. Gaps are .025 inch.

**VALVE TIMING:**—**INLET VALVES:**—Head diameter, 1  $\frac{9}{16}$  inches. Stem diameter,  $\frac{11}{32}$  inch. Stem length, 4  $\frac{29}{32}$  inches. Valve lift,  $\frac{5}{16}$  inch. Spring pressure, 103 pounds with spring compressed to 2 inches. Tappet clearance, .006 inch (hot). Inlet valves open 5 degrees after top dead center and close 45 degrees after lower dead center.

**EXHAUST VALVES:**—Head diameter, 1  $\frac{7}{16}$  inches. Stem diameter,  $\frac{11}{32}$  inch. Stem length, 4  $\frac{29}{32}$  inches. Valve lift,  $\frac{5}{16}$  inch. Spring pressure, 103 pounds with spring compressed to 2 inches. Tappet clearance, .008 inch (hot). Exhaust valves open 40 degrees before lower dead center and close 5 degrees after top dead center. Valve stem guides are removable. Oversize valves are made.

**STARTER:**—Model 714-G. Starter is connected to the engine through a Bendix drive. The direction of rotation is counter-clockwise, viewed from the commutator end. Starter switch is Model 406-A. Brush spring tension is 24-28 ounces.



# WINDSOR

MODEL 6-77 (1929)

DELCO-REMY GENERATING, STARTING SYSTEM

DELCO-REMY IGNITION

## Starter Data

Torque	R.P.M.	Volts	Amperes
0 lb. ft.	5000	5	65
12 "	Lock	3.63	475

**Mounting:**—Starter is flange mounted at left of engine on forward side of flywheel housing. To remove starter, disconnect cable and remove 3 flange mounting bolts. Then pull starter forward and lift from place.

**Oiling:**—Put 5 or 6 drops of light oil in the oiler on the commutator end of the starter every 1000 miles. The drive end bearing is oilless.

**GENERATOR:**—Model 949-V. The direction of rotation is counter-clockwise, viewed from the commutator end. Generator current regulation is by third brush shunt field and thermostat. Thermostat contacts open at 165°F. cutting the resistance across the thermostat contacts in series with the shunt field and reducing the output approximately 40%. To adjust generator output, loosen the small round headed screw on the generator end plate. Remove the commutator cover band and shift the third brush in a counter-clockwise direction to increase the charging rate and in the opposite direction to decrease the charging rate. Tighten the screw after making the adjustment. With standard car setting the maximum charging rate is 20 amperes (cold) reached at 1450 R.P.M. or 25 miles per hour.

## Generator Data

Cold Test			Hot Test		
Amperes	Volts	R.P.M.	Amperes	Volts	R.P.M.
18-20	8.5	1450	9-12	7.5	2000

Motoring generator draws 6 amperes at 6 volts. Shunt field current is 5 amperes at 6 volts. Brush spring tension is 14-18 ounces.

**Mounting:**—Generator is flange mounted at right of engine on rear of timing chain case. To remove generator, take off sprocket cover in front of timing

chain case directly over generator sprocket and remove nut on end of generator shaft. Then remove flange mounting bolts and pull generator to rear. Be careful not to disturb chain on generator sprocket and do not attempt to crank engine with generator out.

**Timing Chain Adjustment:**—Timing chain is adjusted by shifting generator. To adjust chain, loosen two generator flange mounting cap screws and turn up adjusting set screw with engine running until chain begins to hum. Then back off adjustment screw until chain runs noiselessly and tighten cap screws.

**Oiling:**—Put 8 to 10 drops of light oil in the oiler on the commutator end of the generator every 1000 miles. The drive end bearing is oiled by splash from the chain case.

**RELAY:**—Model 265-B. Relay is mounted on the generator. Relay closes when the voltage of the generator reaches 6.75-7.5 volts and opens with a discharge current of 0-2.5 amperes. Relay contacts separate .015-.025 inch. Air gap is .014-.021 inch with contacts closed.

**LIGHTING:**—Delco-Remy Switch Model 1309. Switch is mounted on the lower end of the steering column. Headlights are 6-8 volt, 21-21 cp. (double filament-double contact base using second 21 cp. filament instead of dimming) Mazda No. 1110. Stop light is 6-8 volt, 15 cp. S.C. Mazda No. 87. Dome light is 6-8 volt, 6 cp. D.C. Mazda No. 82. Side (cowl) lights are 6-8 volt, 6 cp. S.C. Mazda No. 81. Dash and tail lights are each 6-8 volt, 3 cp. S.C. Mazda No. 63.

**CURRENT LIMIT RELAY:**—Model 410-C. This device is a vibrating circuit breaker mounted on the dash and connected in the lighting circuits. The circuit breaker begins to vibrate when the current in the lighting circuit reaches 20-30 amperes and continues limiting the current to 2-15 amperes. Circuit breaker contacts separate .012-.030 inch. Air gap is .019-.025 inch with contacts closed.



# WINDSOR

## WHITE PRINCE MODELS 8-82 AND 8-92 (1929)

### DELCO-REMY GENERATING, STARTING SYSTEM DELCO-REMY IGNITION

**BATTERY:**—U.S.L. Type 3-HVX-7X, 6 volt. The negative (—) terminal is grounded. Starting capacity (20 minute rate) is 148 amperes for 20 minutes. Lighting capacity (5 ampere rate) is 5 amperes for 28.4 hours. Battery is mounted under the left front seat.

**IGNITION:**—Coil Model 528-C (8-82) 526-W (8-92). Coil is mounted on the back of the dash with the switch extending through to the face of the instrument panel. The ignition switch is built into the base of the coil. Ignition current is 2 amperes at 6 volts with engine running and 5 amperes at 6 volts with engine stopped.

**Distributor Model 658-H.** Breaker contacts separate .022 inch. Set contact gap by loosening lock screw on stationary contact mounting plate and turning eccentric adjusting screw until correct gap is secured with breaker arm on lobe of cam. Resurface contacts with a fine flat contact file or on a medium hard oilstone. Distributor is semi-automatic. Maximum manual advance is 22 degrees (engine). Automatic advance begins at 600 R.P.M. Maximum automatic advance is 18 degrees reached at 3200 R.P.M. (engine). Breaker has two sets of contacts on a four sided cam. Contacts open alternately at intervals of 45 degrees corresponding to 90 degrees of crankshaft rotation. This is the firing interval of the Windsor engine and contacts must be synchronized for correct performance. See Timing.

**Mounting:**—Distributor is mounted at right of engine directly in front of the generator. To remove distributor, disconnect manual advance rod and primary lead and remove head with cables intact. Then remove manual advance stop screw and lift distributor from place.

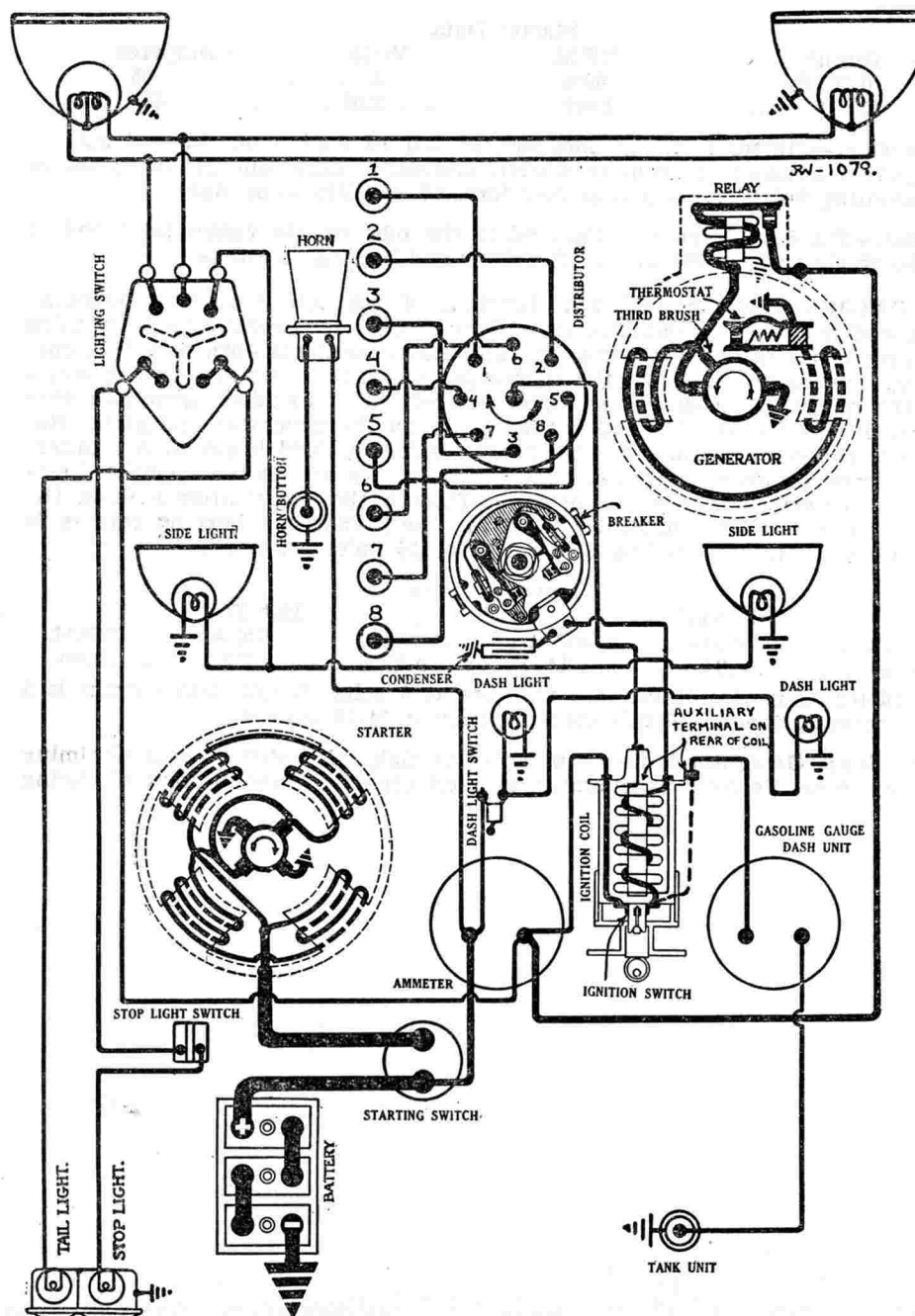
**Oiling:**—Fill the grease cup under the distributor head and turn down two turns every 1000 miles. Every 5000 miles remove the head and rotor and saturate the wick oiler in the center of the shaft with light engine oil. Put a small amount of heavy grease on the face of the breaker cam.

**Timing:**—**Synchronization of Contacts:**—To synchronize contacts, use Delco-Remy Tool, Part No. 820738, and follow directions given on Page S-31 of National Service Manual. Contacts can be synchronized without tool after distributor has been timed to engine by turning over engine 90 degrees from firing position of piston No. 1 when piston No. 6 will reach top dead center entering firing stroke. Make certain that manual spark control is fully retarded. If one set of breaker contacts are not separating, loosen lock screws on breaker plate and turn eccentric adjusting screw until contacts begin to separate. Tighten the lock screws and check contact gap. If it is outside limits of .018-.024 inch, reset at .022 inch and repeat synchronizing operation.

**Timing Distributor to Engine:**—Breaker contacts begin to separate when the piston entering power stroke reaches top dead center with the spark control lever in the fully retarded position. To set timing, crank engine until piston No. 1 enters compression stroke (the upstroke with both valves closed). Fully retard spark lever. Continue to crank engine until piston reaches top dead center. If one set of contacts is not opening, loosen advance arm clamp screw and rotate distributor until contacts open. Tighten the clamp screw. Connect the segment opposite the rotor to the spark plug in cylinder No. 1 and connect the remaining spark plugs in order 6-2-5-8-3-7-4 clockwise around the distributor head.

**Firing Order:**—The firing order is 1-6-2-5-8-3-7-4.

**Spark Plugs:**—Spark plugs are  $\frac{7}{8}$ -18 S.A.E. Standard. Gaps are .025 inch.



# WINDSOR

## WHITE PRINCE MODELS 8-82 AND 8-92 (1929) DELCO-REMY GENERATING, STARTING SYSTEM DELCO-REMY IGNITION

**VALVE TIMING:—INLET VALVES:—**Head diameter, 1½ inches. Stem diameter, .309 inch. Stem length, 5 33/64 inches. Valve lift, 5/16 inch. Spring pressure, 103 pounds with spring compressed to 1 15/16 inches. Tappet clearance, .006 inch (hot). Inlet valves open 8 degrees after top dead center and close 40 degrees after lower dead center.

**EXHAUST VALVES:—**Head diameter, 1¾ inches. Stem diameter, .309 inch. Stem length, 5 33/64 inches. Valve lift, 5/16 inch. Spring pressure, 103 pounds compressed to 1 15/16 inches. Tappet clearance, .008 inch (hot). Exhaust valves open 40 degrees before lower dead center and close 8 degrees after top dead center. Valve stem guides are removable. Oversize valve stems are made.

**STARTER:—Model 724-J.** Starter is connected to the engine through a Bendix drive. The direction of rotation is clockwise, viewed from the commutator end. Starter brush spring tension is 24-28 ounces. Starter switch is Model 406-A.

Starter Data			
Torque	R.P.M.	Volts	Amperes
0 lb. ft.....	3500.....	5 .....	70
22 " .....	Lock.....	3 .....	600

**Mounting:—**Starter is flange mounted at left of engine on forward side of flywheel housing. To remove starter, disconnect cable and remove flange mounting cap screws. Then pull starter forward and lift from place.

**Oiling:—**Put 4 or 5 drops of light engine oil in the starter oiler every 1000 miles.

**GENERATOR:—Model 940-N.** The direction of rotation is counter-clockwise, viewed from the commutator end. Generator current regulation is by third brush shunt field and thermostat. Thermostat contacts open at 165°F. cutting the resistance across the thermostat contacts in series with the shunt field and reducing the output approximately 40%. To adjust generator output, remove the commutator cover band and loosen the small round headed screw on the commutator end plate. Then shift the third brush in a counter-clockwise direction to increase the charging rate and in the opposite

direction to decrease the charging rate. Tighten the screw after making the adjustment. With standard car setting the maximum charging rate is 20 amperes reached at 1450 R.P.M.

Generator Data					
Cold Test			Hot Test		
Amperes	Volts	R.P.M.	Amperes	Volts	R.P.M.
20.....	8.5.....	1450	9-12.....	7.5.....	2000

Generator motoring draws 5.5 amperes at 6 volts. Shunt field current is 5 amperes at 6 volts. Brush spring tension is 14-18 ounces.

**Mounting:—**Generator is flange mounted at right of engine on rear of timing chain case. To remove generator, disconnect lead and remove flange mounting cap screws. Remove carburetor. Then slide generator to rear and lift from place.

**Oiling:—**Put 4 or 5 drops of light engine oil in each of the generator bearing oilers every 1000 miles.

**RELAY:—Model 265-B.** Relay is mounted on the generator. Relay closes when the generator voltage reaches 7-7.5 volts and opens with a discharge current of 0-2.5 amperes. Charging current at closing of contacts is approximately 3 amperes. Relay contacts separate .015-.025 inch. Air gap is .014-.021 inch with contacts closed.

**LIGHTING:—Delco-Remy Switch Model 1309.** Lighting switch is mounted at base of steering column. Headlights are 6-8 volt, 21-21 cp. (double filament-double contact base using second 21 cp. filament instead of dimming) Mazda No. 1110. Stop light is 6-8 volt, 15 cp. S.C. Mazda No. 87. Dome light is 6-8 volt, 6 cp. S.C. Mazda No. 81. Side (cowl) lights are 6-8 volt, 6 cp. S.C. Mazda No. 81. Dash and tail lights are each 6-8 volt, 3 cp. S.C. Mazda No. 63.

**CURRENT LIMIT RELAY:Model 410-C.** This device is a vibrating circuit breaker mounted on the dash and connected in the lighting circuits. The circuit breaker begins to vibrate when the lighting current reaches 20-30 amperes and continues limiting the current to 2-15 amperes. Circuit breaker contacts separate .012-.030 inch. Air gap is .019-.025 inch with contacts closed.